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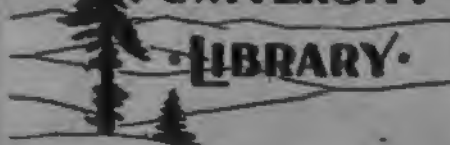
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THE
EARTHQUAKE CATALOGUE

OF THE

BRITISH ASSOCIATION,

WITH THE

DISCUSSION, CURVES, AND MAPS, ETC.

STANFORD : 1858.

BY

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AND

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[*From the* TRANSACTIONS OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT
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Catalogue of recorded Earthquakes from 1606 B.C. to A.D. 1850.

1. Date. BEFORE CHRIST.	2. Locality.	3. Direction, duration, and number of shocks.	4. Phenomena connected with the sea.	5. Meteorological and other phenomena.	6. Authority.
1606	Mount Sinai .....	.....	.....	Accompanied by thunder and lightning; on the occasion of the delivery of the law.	Exodus, xix. 18.
Between 1604 and 1586.	Arabia .....	.....	.....	Korah, Dathan, and Abiram swallowed up	Numbers, xvi. 31.
1566	Jericho.....	.....	.....	The walls of the city thrown down	Joshua, vi.
About 1450...	Lacus Cimini, in central Italy.	.....	.....	A city swallowed up, and a lake produced in its place.	Sotion, quoted in Aristot. Op. ed. Sylburgi, vol. ii. sec. 6. p. 128; and Anm. Marcell. lib. xvii. c. 7. sec. 13.
About 900 ...	Palestine .....	.....	.....	After Elijah had prayed for rain from heaven	1 Kings, xix. 11.
About 900 ...	The Alban Lake, in Italy	.....	.....	.....	Aurel. Victor, de orig. gent. Rom. c. 18; and Dion. Halic. lib. i. c. 71.
880, or betw ⁿ this and 870.	Palestine .....	.....	.....	.....	Amos, i. 1; and Zechariah, xiv. 5.
595	China .....	.....	.....	.....	Du Halde, Description de la Chine, t. i. p. 326.
About 550, or between this and 530.	Lacedamon .....	.....	.....	A portion of Mount Taygetus thrown down.....	Strabo, lib. viii. iii. p. 202; and Pliny, lib. ii. c. 79 (81).
486	The Island of Delos .....	.....	.....	Herodotus remarks that this was the first time, up to the period at which he wrote, that this island had experienced earthquake shocks. Others also speak of it as free from such cala-	Herodotus, Erato, c. 98; and Strabo, lib. x. iv. p. 313.

1.	2.	3.	4.	5.	6.
432, or 431... 431, or soon after.	Roman territories Delos .....	.....	.....	Houses were thrown down	Livy, lib. iv. c. 21. Thucydides, lib. ii. c. 8.
426	Athens, Eubœa, Bœotia, and especially Orchomenos.	.....	.....	.....	Thucydides, lib. iii. c. 87.
425	In Greece, especially in Eubœa, and Atalante.	.....	Accompanied by great inundations of the sea.	.....	Thucydides, lib. iii. c. 89; and Diodorus, lib. xii. c. 59.
424. In spring	In the Peloponnesus.....	.....	.....	Shortly after an eclipse of the sun	Thucydides, lib. iv. c. 52.
377	Lisbon .....	.....	.....	.....	Balbi, Essai politique sur le Royaume de Portugal, t. i. p. 102.
373	Peloponnesus, especially at Helike and Bura.	.....	Great inundations of the sea, overwhelming Helike.	.....	Strabo, lib. i. and viii.; and Pausanias, lib. vii.; Achaica, c. 24—25.
370	Lisbon .....	.....	.....	.....	Balbi, t. i. p. 102.
364	Rome .....	.....	.....	A great chasm opened in the forum, which afterwards filled with water, forming the Lacus Curtius. <i>Probably</i> an earthquake.	Livy, lib. vii. c. 6; and Pliny, Hist. Nat. lib. xv. c. 18 (20).
Before 323 ...	Island of Chryse, near Lemnos.	.....	.....	The island was sunk into the sea	Ukert upon Lemnos and Mosychlos in the allgem. geograph. Ephemer. for Dec. 1812.
285, or 284...	In the provinces Oomi and Sourouga of the Japanese island Nippon.	.....	.....	In the province of Oomi a large tract of land sank in one night, forming a lake 72½ miles long and 12½ wide. In Sourouga volcanic eruptions, and the mountain Fousi-no-Yama, still an active volcano, was thrown up.	Kämpfer, (v. Dohm.) Japan, vol. i. p. 190; v. Humboldt, Frag. de Géogr. Asiat. vol. i. p. 223.
282	Delphi .....	.....	.....	A portion of a hill thrown down; the earthquake followed by a violent storm of hail.	Justinus, lib. xxiv. c. 8.
About the samesame.	Country about the Chersonesus and Hellespont.	.....	.....	The city Lysimachia destroyed	Justinus, lib. xvii.; at the beginning.
276, or perhaps 271.	Probably near Picentia in the south of Campania.	.....	.....	Accompanied "horrendo fragore"	Orosius, lib. iv. c. 4.
224	Carthage, and the island of Rhodes.	.....	.....	The colossus of Rhodes thrown down. (ii. n. 235 and 247)	Eusebius v. Hoff. Chronik vol. i. p. 140

At the same time, or very soon after.	Libya .....	.....	.....	A hundred towns destroyed	Augustinus de Mirabilibus, lib. ii.
218	"In vico Istrico (or Insteio)."	.....	.....	No shock mentioned. The water of a well burst forth in an extraordinary manner.	Livy, lib. xxiv. c. 10.
197	Rome, or the country round.	.....	.....	.....	Livy, lib. xxxiv. c. 55.
197, or 196....	Italy .....	.....	.....	Shocks continuing for thirty-eight days	Livy, lib. xxxv. c. 40.
About the same time.	the Rhodes, and parts of Asia Minor.	.....	.....	Many towns ruined.....	Justinus, lib. xxx. c. 4.
184, or 183....	Rome .....	.....	.....	The public statues of the gods were moved.....	Livy, lib. xli. c. 59.
177, or 178....	Country of the Sabines .....	.....	.....	Many buildings thrown down	Livy, lib. xli. c. 28.
175	China .....	.....	.....	.....	Edinburgh Encyclopædia, Article Chronology.
140	China .....	.....	Three earthquakes in this year.	.....	Kämpfer, Japan, vol. i. p. 193.
138	Luna, near Carrara.....	.....	.....	Perhaps only a landslip	Julius Obsequens.
123—122	Privernum, in Latium....	.....	.....	Seven acres of land sank into the earth. Perhaps not an earthquake.	Julius Obsequens.
122—121	Probably at Rome: place not mentioned.	.....	.....	Accompanied by subterranean noise	Julius Obsequens.
104—103	In the territory of Picenum.	.....	.....	Ditto	Julius Obsequens.
103—102	Nursia .....	.....	.....	Buildings thrown down; accompanied by subterranean noise.	Julius Obsequens.
101—100	Pesaro .....	.....	.....	Accompanied by noise; buildings thrown down	Julius Obsequens.
99—98	Venafrum .....	.....	.....	No shock mentioned; the earth opened and sank down.	Julius Obsequens.
96—95	Fesulæ .....	.....	.....	No shock, but subterranean noise (fremitus) ...	Julius Obsequens.
96—94	Rhegium .....	.....	.....	Buildings injured	Julius Obsequens.
95—.....	Syria, and the Island of Cyprus.	.....	.....	.....	v. Hoff, vol. ii. p. 137; without quoting authority.
92	Province of Oomi in Nippon, Japan.	.....	.....	An island (now called Tsikou-bo-sima) was raised in the lake produced in the year 285 B.C.	v. Humboldt, Frag. de Géogr. Asiat. t. i. p. 223.
85,	Reate, in the country of the Sabines.	.....	.....	Great damage done to buildings, bridges, &c.; attended by subterranean noise.	Julius Obsequens.
80—.....	Spoleto .....	.....	.....	.....	Julius Obsequens.

thrown down.

33, or 32.....	30,000 men lost their lives	Eusebius, p. 259. Not in the Greek.	Like the last, only found in the Armenian and Latin translations.
31, or 30.....	Produced great destruction	Eusebius, p. 261. Not in the Greek.	Not in the Greek.
About the same time, or shortly before or after.	Thirteen cities of note destroyed	Münster's Cosmogr. lib. v. Calvisius.	Like the last, only found in the Armenian and Latin translations.
26	At the crucifixion. The city of Nisæa was destroyed.	Tacitus, Annal. lib. ii. c. 47; Eusebius, p. 263.	Not in the Greek.
21	Two shocks on the same day.	Matthew, xxvii; Luke, xxi. 20; Eusebius, p. 265.	Not in the Greek.
10, or according to others 6	At the crucifixion. The city of Nisæa was destroyed.	v. Hoff, vol. ii. p. 227; without quoting authority.	Not in the Greek.
ANNO DOMINI.	Philippi, in Macedonia.	Acts, xvi.	Not in the Greek.
11 or 12	The cities of Laodicea, Hierapolis, and Colosse in Phrygia.	Eusebius, p. 272. Only in the Armenian and Latin.	Not in the Greek.
15	Seneca, Natural. Quæst. lib. vi. c. 1.	Seneca, Natural. Quæst. lib. vi. c. 1.	Not in the Greek.
17	Tacitus, Hist. lib. xv. c. 22; Seneca, Nat. Qu. lib. i. c. 1 and 27.	Tacitus, Hist. lib. xv. c. 22; Seneca, Nat. Qu. lib. i. c. 1 and 27.	Not in the Greek.
33	A meadow and field planted	Pliny, Hist. Nat. lib. ii. c. 83 (85).	Not in the Greek.
34			
52			

79. At night Misenum, and the country round.	The sea receded from the coast.	The houses trembled; followed the day after by the eruption of Vesuvius, in which Herulanum and Pompeii were destroyed.	Pliny the younger, Epist. 6, 16-20.
† 105, or 106. Asia Minor, and parts of Greece.			Eusebius, p. 281. Only in the Armenian and Latin; Orosius, lib. vii. c. 12.
† 109, or 110. Galatia.		Three cities destroyed.	Eusebius, p. 283; Orosius, lib. vii. c. 12.
115. China.		From 107 to 115 several earthquakes took place in China, of which this was the most violent.	Du Halde, i. 365.
† 115, or 117. Antiochia.		Violent winds and thunder preceded the earthquake.	Eusebius, p. 283. Not in the Greek. Calvisius.
121, or 122. Nicomedia and Nicæa in Bithynia.			Eusebius, p. 283. Not in the Greek. Eusebius, p. 285.
127, or 128. Nicopolis and Neceæ. The earthquake was sarsa in Pontus, and experienced twice at Hierapolia, Laodicea, and Nicomedia; also at Syracuse.			
131. Sicily.			
150, or shortly before. Caria, Lycia, and the island of Rhodes.			v. Hoff, vol. ii. p. 227. Authority not quoted.
160. Smyrna.			Calvisius refers to Pausanias in Arcad.
169. Parts of Germany.			v. Hoff, vol. ii. p. 146.
169, or 177. Smyrna.			Bernhertz, p. 51.
176. On the Rome.			Eusebius, p. 293.
223. (On the 9th and 17th of December according to Calvisius).		Accompanied by an eclipse.	Calvisius quotes Fasti Sic.
252. Rome, Libya, and Asia Minor.	Many cities inundated by the sea.	Attended by an eclipse. The earth opened in many places and salt water gushed out: dreadful subterranean noises heard.	Trebellius Pollio in Gallien. ii. c. 5. Calvisius.
257. Japan.	Many shocks at various periods from 200.	Tyre and Sidon greatly injured.	Kämpfer (v. Dobm), i. p. 197.
257, or 258. Syria.			Orosius, lib. vii. c. 25.
257, or 258. Opus in Greece.			v. Hoff, vol. ii. p. 174.
257, or 258. Aroropolis, on the Dead Sea.			K. Ritter's Erdbeschreibung, vol. ii. p. 339.

	3.	4.	5.
d .....	.....	.....	Twelve towns destroyed.....
ast ...	Very many and violent shocks.	.....	The shocks began this year and were continued the next.
at An-	Ditto .....	.....	.....
East .....	.....	.....	Many cities overturned
.....	.....	.....	Lycosthenes and Frytschius.
.....	.....	.....	Sigonius, i. lib. v. p. 169; Frytschius.
odes, Dyr- and twelve Campania; me. Syria	Lasted three days at Rome.	.....	Sigonius, <i>loc. cit.</i> p. 170; Cedrenus.
or, Bithynia, cedonia. in Bithynia	.....	.....	Sigonius, <i>loc. cit.</i> p. 178; Agathias de reb. Just. p. 51. Sigonius, p. 204; Muratori, Annali, t. ii. p. 392. Chronicon Paschale, p. 293; Eusebius, p. 185.
and Nicæa....	.....	.....	Sigonius, p. 227; Baronius, t. iv. p. 117.
ople .....	.....	.....	Sigonius, p. 228.
Asia Minor; te.	The sea retired, and then flowed in again with violence, doing great damage.	.....	Baronius, p. 187; Sigonius, p. 236; Calvisius.
shocks .....	.....	.....	Frytschius. Chronicon Paschale, p. 301; Sigonius, p. 249; Calvisius. Baronius, t. iv. p. 211.

372	Nicaea	.....	.....	.....	This date is by no means well fixed, authors varying from 367 to 379.	Gaultier, p. 309; Frytschius.
382	Constantinople and Rome.	.....	.....	.....	.....	Evagrius; Baglivi.
394.	From Throughout Europe	.....	.....	.....	.....	Marcellinus Comes, p. 37.
395.	Sept. to Nov.	.....	.....	.....	.....	Signonius, p. 345; Baronius, p. 706.
396	Jan. following.	.....	.....	.....	.....	Signonius, p. 355.
403.	During Constantinople	.....	.....	.....	.....	Baronius, t. v. p. 178.
407.	April 1 Place not mentioned; probably Constantinople.	.....	.....	.....	.....	Chronicon Paschale, p. 308.
408	Rome	.....	.....	.....	.....	Signonius, p. 393; Marcellinus Comes.
417.	April 20 Probably Constantinople; also Kybera in Asia Minor.	.....	.....	.....	.....	Prosperi Tyronis Chron.; Dom Bonquet, t. i. p. 637.
419	Palestine	.....	.....	.....	.....	Chron. Pasch. p. 310; Marcellinus Comes.
422	Constantinople?	.....	.....	.....	.....	Marcellinus Comes, p. 38.
423.	April 7; Constantinople?	.....	.....	.....	.....	Chronicon Paschale, p. 343.
423.	April 7; Constantinople?	.....	.....	.....	.....	Ditto.
427	"In multis locis" Constantinople	.....	.....	.....	.....	Marcellinus Comes.
427	Place not mentioned	.....	.....	.....	.....	Marcellinus Comes, p. 41.
431.	June 20; hour of night.	.....	.....	.....	.....	Baronius, p. 628.
434	the winter	.....	.....	.....	.....	Anciennes Révolutions du Globe.
442.	Constantinople	.....	.....	.....	.....	Baronius, t. vi. p. 12.
444	Throughout most of the civilized world.	.....	.....	.....	.....	Hist. Rerum Germanicarum, Schard. f. 70.
446	.....	.....	.....	.....	.....	Baronius, t. vi. p. 37; Christ. Math. Theat. Hist. p. 377.

v. 8...	Constantinople; also felt in Thrace, the Chersonesus, the Troad, Bithynia, Phrygia, and the Hellespont.	.....	.....	Violent shocks, .	.....
.....	Gallicia in Spain	.....	.....	.....	Idatius, Chronicon.
Jan. ...	Constantinople	.....	.....	Violent shocks. Lycosthenes gives the date	Chron. Pasch. pp. 318, 319; Christ. Math. Theat. Hist. p. 378.
July 10	Sabaria (Sarwar) in Pan-	.....	.....	.....	Sigonius, lib. xiv. p. 516.
.S.).	nonia.	.....	.....	.....	Idatius, Chronicon.
Sept. 11;	Gallicia in Spain	.....	.....	Others give the dates 450, 460 and 462	Baronius, t. vi. p. 244; Idatius.
th hour of	Antioch; also felt	.....	.....	.....	.....
he night.	throughout Asia Minor,	.....	.....	.....	.....
0, or 464...	and in Thrace.	.....	.....	.....	.....
55, or 468...	Cyzicus in Mysia	.....	.....	.....	.....
March 27...	Vienne in Dauphiny	.....	.....	Several other dates given for this occurrence	Marcellinus Comes. Sidonius Apollinaris, lib. vii. Ep. i. ad Mamertum; Gregorius Turo-
167	Ravenna	.....	.....	.....	nensis, &c.
171, or 472...	In Asia Minor	.....	.....	.....	Sigonius, <i>loc. cit.</i> p. 538.
177, or 478...	Constantinople; also at	.....	.....	Several cities overwhelmed	Marcellinus Comes.
Sept. 25	the Hellespont, the Cy-	.....	.....	.....	Marcellinus Comes, Cedrenus, Eva-
	clades, Cos, and Cnidos.	.....	.....	.....	grios, lib. ii. c. 14.
Sept. 23	Rome	.....	.....	.....	Baglivi, <i>loc. cit.</i>
180, or 81.	Place not mentioned	.....	.....	.....	Gregor. Turon. lib. ii. cc. 19, 20.
187. Sept. 26	Constantinople; extend-	.....	.....	.....	Chronicon Paschale, p. 327.
	ed as far as Taurus.	.....	.....	.....	.....
192. June 7	Place not mentioned	.....	.....	.....	Sigonius, p. 579.
.....	Syria and Asia Minor;	.....	.....	The cities mentioned were overwhelmed	Marcellinus Comes, p. 46.
	especially at Laodicea,	.....	.....	.....	.....
	Tripolis.	.....	.....	.....	.....
		.....	.....	This date is very uncertain, others giving various	Baronius, t. vi. p. 541.
		.....	.....	years up to 506.	.....
		.....	.....	The earth opened in many places to the extent	Marcellinus Comes, p. 50; Baronius,
		.....	.....	of twelve feet in width, from some of which	t. vi. p. 702.

1.	2.	3.	4.	5.	6.
558 (May 3, according to Pogg. Ann. t. lvi. p. 650).	Constantinople	Shocks still continuing .....	.....	.....	Cedrenus, p. 386.
560. Dec. (24 according to Pogg. Ann. quoted above).	Ditto .....	.....	.....	A conflagration and a pestilence in the same year.	Theophanes, p. 199; Cedrenus, p. 387, &c.
562, or 563...	Berytus, and in the island of Coë.	.....	.....	.....	Frytschius; Marmont, Voyage en Hongrie, t. ii. p. 259.
577	A mountain on the banks of the Rhone; according to v. Hoff, the Dent du Midi in the Valais.	.....	.....	The mountain gave forth a subterranean noise like bellowing for some days, and then fell with houses, men, &c. upon it, into the stream below.	Matthew of Westminster, lib. i. p. 195; Gregor. Turon. lib. vi. c. 31; Frytschius, &c.
579. At noon 579, or 580...	Chinon .....	.....	.....	The church trembled during the celebration of the service.	Dom. Bouquet, t. ii. p. 242.
582	Antioch and Daphne .....	.....	.....	.....	Baronius, p. 626; Evagrius.
583	Bordeaux and in the Pyrenees.	.....	.....	In the Pyrenees great stones were rolled down from the mountains.	Dom Bouquet, t. ii. pp. 252 and 409. t. iii. pp. 83 and 227.
584 (Dec.?)...	Soissons and Angers .....	.....	.....	Subterranean commotions	Ditto, t. ii. p. 277. t. iii. pp. 88 and 234.
586	Constantinople? .....	.....	.....	.....	Theophan. p. 213; Cedren. p. 394.
587. Sept. 30, 3 hours after twilight.	Angers .....	.....	.....	.....	Dom Bouquet, t. ii. p. 297. t. iii. p. 243.
589. Oct. 21 (31, at nine in the evening according to	Rome .....	.....	.....	.....	p. 243.
	Antioch .....	.....	.....	.....	Baglivi, p. 542.
	Ditto .....	.....	.....	.....	Baronius, p. 699; Ch. Mathias, p. 426.
		.....	.....	.....	Mémorial de Chronologie, t. ii. p. 909; Evagrius, lib. vi. c. 8.

1.	2.	3.	4.	5.	6.
746. Jan. 18, 4th hour.	Syria and Palestine, especially round Jeru- salem.	.....	.....	Great damage done, both to buildings and life....	Theophanes, p. 354; Cedrenus, p. 462; Anastasius, p. 143; Ba- ronius, p. 184.
749 (Jan.?)...	Syria and Mesopotamia	.....	.....	Parts of the hills thrown down. A chasm opened in the earth of more than 1000 paces long. The date somewhat uncertain.	Theophanes, p. 357; Cedrenus, p. 463; Anastasius; Baronius, &c.
757. March 9.	Syria and Palestine.....	.....	.....	.....	Theophanes, p. 361; Anastasius, p. 146; Centuriæ Magdeburg. p. 491.
775	Antioch .....	.....	.....	.....	v. Hoff, vol. ii. p. 173.
778	Italy, at Trevisa, &c. ....	.....	.....	.....	Dom Bouquet, t. v. p. 70.
786. In the latter months of the year.	Germany. Principally in Bavaria.	.....	.....	Buildings thrown down; forty-eight people killed.	Beuther quotes Avent. Annal. lib. iii. in fine.
789. Feb. 9...	Constantinople .....	.....	.....	.....	Theophanes, p. 392; Cedrenus, p. 471; Anastasius, p. 162, &c.
—	Rome .....	.....	.....	.....	Baglivi, p. 542.
794	Alexandria in Egypt .....	.....	.....	The Pharos overturned	Hadschi Chalifa.
795, or 797.	Island of Crete .....	.....	.....	.....	Theophanes, p. 397; Anastasius, p. 165.
Apr. During the night.	.....	.....	.....	.....	Ditto.
— May, 4	Constantinople. (Either this or the last also felt in Sicily, according to v. Hoff.)	.....	.....	.....
801. Apr. 25, or 30; 2nd hour of the night (v. Hoff gives the date	France, Germany, Italy, and on the Rhine.	.....	.....	Many buildings in Italy thrown down. Amongst others the basilica of St. Paul at Rome. It does not seem certain that the shocks happened on the same day or even month in Italy as in Germany, France, &c.	Dom Bouquet, pp. 24, 365; Collec- tion de Duchêne; Simon Schard; Hondorf, Annal. Francorum, &c.

[illegible]

1.	2.	3.	4.	5.	6.
844	Different parts of Italy	Many and violent shocks.	.....	.....	v. Hoff, vol. ii. p. 202.
847. June ...	Country between Rome and Beneventum.	.....	.....	.....	Signonius, p. 301; Baronius, t. x. p. 53; Christ. Mathias, p. 498, &c.
849. Feb. 17. 10th hour of the night.	Through Gaul; also at Auge (now Richenaw) near Constance, in Switzerland.	.....	.....	.....	Dom Bouquet, t. vii. pp. 65, 207, 235 and 272.
855. Jan. 1	Mayence; also at Worms	Twenty shocks	.....	Accompanied by thunder, lightning, hail, &c....	Simon Schard, fol. 109; Dom Bouquet, t. vii. pp. 217 and 233; Duchêne, t. ii. p. 553.
—	Japan	Many violent shocks	.....	.....	Kämpfer, v. Dohm, vol. i. p. 213.
856. Dec. 13	Bâle	.....	.....	Chasms opened in many places in the mountains and rocks.	Martène et Durand, t. v. p. 271.
—	Persia, Khorassan, Syria, Arabia; and especially at Kumis, Rai, and Hamadan.	.....	.....	Accompanied by violent storms of wind	Hadschi Chalifa; El Makin, p. 150; D'Herbelot, Bibl. Orient.
858. Jan. 1	Many countries and towns, but especially at Mayence.	Many violent shocks	.....	.....	Dom Bouquet, t. vii. p. 166; Duchêne, t. ii. p. 554.
— Dec. 25	Ditto	Many and violent shocks by night and day.	.....	.....	Dom Bouquet, t. vii. p. 73.
— (About winter?)	Constantinople	Violent shocks	.....	.....	Cedrenus, p. 552.
—	Switzerland	.....	.....	.....	Bertrand, p. 29.
859	Mayence	Many shocks	.....	Followed, the next year, by a very severe winter. This earthquake is probably confounded with the one in 858.	Dom Bouquet, t. vii. p. 234.
—	Antioch, Laodicea, and other towns of Syria.	.....	.....	More than 1500 houses thrown down at Antioch. A part of the mountain Askraeos near Laodicea	Hadschi Chalifa; Abulfaradsch, p. 166; El Makin, p. 190.

861. Aug. ...	Constantinople	Shocks lasting for forty days.	.....	.....	Baronius, t. x. p. 198.
862. May 23	Constantinople, and in the province of Bagdad.	.....	.....	Other authors give the dates 855 and 860	El Makin; Purchas; Chr. Mathias; Zonaras, p. 162; Baronius, p. 213.
863	Neighbourhood of Eri- van.	Very violent .....	.....	Did immense damage to buildings and life	Mkhitord'Ani, Chakathouno, <i>loc. cit.</i>
867. Jan. 9...	Constantinople	Shocks for forty days and forty nights.	.....	.....	Leonis, Grammat. Chronog. p. 470; Georgii Mon. novi Imper. p. 544.
Oct. 9	"Per plurima loca" ..	.....	.....	.....	Dom Bouquet, t. vii. pp. 173, 208, 235 and 275.
867	Switzerland.....	.....	.....	.....	Bertrand, p. 30; Scheuchzer.
867	Neighbourhood of Mecca.	.....	.....	All the wells stopped flowing.....	Mémorial de Chronologie, t. ii. p. 910.
870. Dec. 3, 1st hour.	Mayence .....	.....	.....	.....	Dom Bouquet, t. vii. pp. 176 and 236.
872. Dec. 3, 1st hour.	Ditto .....	.....	.....	Most probably confounded with the last-men- tioned earthquake.	Ditto. Lerner's Chronik von Frank- furt, &c.
880. Jan. 1...	Ditto .....	.....	.....	Accompanied by an eclipse of the sun	Ragor, Beuther, &c.
881. Dec. 30.	Ditto	Very violent.....	.....	.....	Dom Bouquet, t. viii. pp. 41 and 246; Collection Académique, Cent. Magdeb., &c.
Before the crowing of the cock.	.....	.....	.....	.....	.....
885	Ditto .....	.....	.....	The church of St. Alban was overthrown. Pro- bably confounded with one of the other earth- quakes at the same place.	Münzenus in Chronographia; Cent. Mag.
887	Egypt	Very violent.....	.....	Abulfaradsch mentions an earthquake in 883 probably the same with this.	El Makin.
893	India .....	.....	.....	The capital (the name of this city is not given) was destroyed, and 180,000 men perished. Preceded by an eclipse of the sun, and fol- lowed by great storms. The same year white and black meteoric stones fell, accompanied by thunder and lightning.	Abulfaradsch, p. 178-80; El Makin.
894	Environs of Erivan; town of Doun.	.....	.....	20,000 persons lost their lives	Chakathouno; Michael Tchomtchian.
895. During Council	In many regions of the Western Franks.	.....	.....	.....	Dom Bouquet, t. viii. p. 56.

I.	2.	3.	4.	
3. Jan. 9...	Rome At Sens? "Circa cæno- bium S. Columbæ Virginis." Rai and Thabarestan ... Rome .....	..... ..... ..... .....	..... ..... ..... .....	The basilica of the Lateran t. ix. p. 100. Hadschi Chalifa. Collection Académique, Baglivi, <i>loc. cit.</i>
11	Rai and Thabarestan ... Rome .....	..........	..........	..........
'22	"In pago Cameracensi" (Cambrésis). Thrace .....	..... .....	..... .....	Dom Bouquet, t. viii. p. 179; Du- chêne, t. ii. p. 592. Leon. Grammatici Chronol. p. 502; Hist. Byzantinæ, Combefsius, pp. 256, 486 and 582. Kämpfer, v. Dohm, vol. i. p. 215. Centuriæ Magdeburgenses.
929, or 930...	Thrace .....	.....	.....	.....
931	Japan	Very violent.....	.....	Kämpfer, v. Dohm, <i>loc. cit.</i>
935. Jan.....	Monastery of S. Colom- ba. At Sens?	.....	.....	Dom Bouquet, t. viii. p. 251, and t. ix. p. 92; Cent. Magd.; Ragor.; Bertrand, &c.
938	Japan .....	.....	.....	Chronicon Hirsaugiense; Wittekind.
944. Apr. 16.	Switzerland. (Other au- thors do not mention any place.)	.....	.....	Gesta Sax. lib. iii.; Sigeberti Chron., &c.
"Circa pullo- rum cantum." 950, or 951, or 952.	"Per multa Germaniæ et Galliæ loca." Rai and Thalekan	Several violent shocks .....	.....	Ibn el Atsir in Abulfeda, Ann. ii. p. 467; Hadschi Chalifa; Bar Hebræus; El Makin.
957	Rai and Thalekan .....	.....	.....	Abulfaradsch, p. 196; El Makin.
958	Deisan and Kaschaa in Persia, and the coun- try round. Egypt	More violent than that of the preceding year. .....	.....	Marai, Geschichte der Regenten v. Ägypten. übersetzt v. Reiske in Büsching's Magazin, t. v. p. 369. Cedrenus, p. 660; Zonaras, p. 206; Léon Diacre, p. 41. Baronius, p. 796.
965, or 967 ...	Egypt .....	.....	.....	.....
Sept. 2. In	In Paphlagonia, Hono- ria, and Claudiopolis.	Very violent Three shocks during .....	..... .....	Bernherz; Collection Académique. Simson Danelmends; Collection

855	In the evening. 982	Capua and Beneventum .....	.....	.....	Others give the date 983, and others that of 997, saying that it was accompanied by an aurora. An eruption of Vesuvius took place in 983.	LEON DIACRE, p. 109. Philippi Bergomat. Suppl. Chron. fol. 265. Beuther quotes Peucer in exposit. 3. part. Chron. Carion. Collection Académique. Cedrenus, p. 696; Michael Glycas, p. 309; Baronius, p. 843; Ch. Mathias, p. 554. Muratori, t. vii. p. 164. Sarti, su i terremoti, cap. 3. Vattier, Vie des 49 chalifs par Le Macine, p. 262.
+	983. Sept. 23.	Cyzicum, Nicæa, and other places. Laybach in Carniola ...	.....	.....	.....	.....
+	986. October.	Constantinople; also felt all through Greece.	.....	.....	.....	.....
+	990	Beneventum and Capua .....	.....	.....	.....	.....
+	991	Borgo S. Sepolcro .....	.....	.....	.....	.....
+	992. Aug. ...	Damascus .....	.....	Shocks did not cease until the 14th day of the following month (Saphar).	.....	.....
+	996. Aug. ...	Place not mentioned .....	.....	.....	.....	Philippi Bergomat. Suppl. Chron. fol. 286. El Makin.
+	997	Egypt .....	.....	Very violent .....	.....	Beuther quotes Fabricius.
+	.....	Magdeburg .....	.....	Several shocks .....	.....	Beuther quotes Naucner; Curio; Collection Académique; Cent. Magd.
+	Dec. 14.	Place not mentioned .....	.....	.....	.....	Almost all the chronicles of the time.
+	999.	Throughout Europe. No particular place mentioned.	.....	.....	.....	.....
+	1000.	Poland .....	.....	.....	.....	Gazette de France, 14th April 1786; Gentleman's Mag. vol. lvii. p. 175. Baglivi, loc. cit.
+	.....	Rome .....	.....	.....	.....	Bertrand, Coll. Académique, p. 516. Sigonius, p. 474.
+	.....	Switzerland .....	.....	.....	.....	.....
+	1001 or 1005	Campania .....	.....	Lasted fifteen days	Accompanied by igneous meteors. Overthrew many buildings; amongst others the monastery of Monte-Cassino, the chronicle of which house gives the date 1005, which would probably make it coincide with the one following.	Collection Académique, Baglivi, loc. cit.
+	1004,	.....	.....	.....	.....	.....
+	Jan. to March.	Rome .....	.....	Shocks during the time mentioned.	.....	.....
+	1005.	Deinar in Irak .....	.....	.....	10,000 persons were buried in the ruins of buildings, and many more swallowed up by the earth. At Bagdad great snow.	Hadschi Chalifa; Abulfaradsch, p. 219.
+	1007 .....	.....	.....	.....	.....	Collection Académique; Mémorial de Chronol. t. ii. p. 911.
+	1009	"Lisbon, and the countries of the south."	.....	.....	.....	.....

1.	2.	3.	4.	5.	
1010. Jan. to March 9. On this day (9th March) at the 10th hour.	Constantinople	Very many and violent shocks. The principal one on the 9th March.	.....	Accompanied on the 9th March by a terrible noise. Baronius gives the date 1011.	Cedrenus, p. 706; Michael Glycas, p. 310.
1012	Place not mentioned .....	.....	.....	.....	Beuther quotes Sabellicus and Nauclerus.
1013, or 1014. Sept. 18 and Nov. 18. On the first occasion about midday.	Place not mentioned. The one of the 18th September probably felt at Liège.	.....	.....	Some uncertainty as to the date	Chron. Leodienense, Lahbe, t. i. p. 337; Chron. Magdeburg.; Dom Bouquet, t. x. pp. 218 and 321.
1016	Poland.....	.....	.....	.....	Gazette de France, April 14, 1786; Gentleman's Mag. vol. lvi. p. 175. Collection Académique.
1017	Rome .....	.....	.....	.....	Mémorial de Chronol. t. ii. p. 911.
1021. May 12.	Lisbon.....	.....	.....	.....	Bertrand; Scheuchzer; Collection Académique; Bernherz quoting Aretius; Dom Bouquet, t. x. p. 193; Simon Schard, &c.
1029	Many parts of southern Germany, especially in Bavaria; and at Bâle.	.....	.....	The wells all through Switzerland were troubled, and the water in many became red like blood. Great inundations were produced in many places. Igneous meteors were observed. Some authors (as Chron. Alberti) give the date 12th May 1020.	
1031. Aug. 13. hour of	Damascus .....	.....	.....	Half the city was ruined	El Makin.
	Constantinople .....	.....	.....	v. Hoff gives the date 1032	Cedrenus, p. 730.
	.....	.....	.....	v. Hoff gives the date 1033, or 1034	Cedrenus; also Abulfaradsch, p. 233.

near on the night.	China, in the province Schen-si. (Extending from the west side of the river Hoangho to 150 Li (= 12 geogr. miles) beyond its east- ern bank?)	two were slight, and one violent.	and five villages were swallowed up.	De Maille, Hist. Gén. de la Chine, t. viii. p. 207.
1038. Nov. 2 (Nov. 6, ac- cording to v. Hoff, 10th hour of the day.	Constantinople	Shocks lasting until the following Janu- ary.		Cedrenus, p. 740; Baronius, & xi. p. 130.
1039	Ditto		Not mentioned by the Byzantine writers	Baronius, <i>loc. cit.</i>
1040. Feb. 2.	Smyrna. Several other towns also injured.			Cedrenus, p. 742; Diar. Hist. p. 44.
	Tabriz in Persia; also felt in Africa.		Many buildings thrown down; 50,000 persons perished. Probably on the same day as that at Smyrna.	Hadschi Chalifa.
	In Lombardy, and throughout Italy.			Jacobi Malvecii Chron. Muratori, t. xiv. p. 872.
1041. June 10, 12th hour of the day.	Constantinople			Cedrenus, p. 748.
1043 May 1.	Ditto	Shocks lasting four months.	Ditto.	
1048.	Japan	Very violent		Kämpfer, v. Dohm, vol. i. p. 217.
	England			Courrier Français, 27th March, 1843.
1043 May 1.	Worcester, Derby, and many other parts of England.		Followed by a mortality amongst man and beast	Collection Académique, Anciennes Révolutions du Globe, Rerum Anglic. Script. fol. 51.
Oct. 13, or 15 and 16	Constance, and on the lake of same name.	Violent shocks		Lycosthenes; Cent. Mag.; Dom Bouquet, t. xi. p. 20.
1052 or 15	Chusistan, and especial- ly in the city of Ardschan; also in the city of Bibak in Khorassan.		A large mountain in the neighbourhood of the city of Ardschan cleft in two, so that one could see into the interior.	Abulfeda, ii. p. 143.
1053 14th	In the China, in the district Yu-tschu.		Many buildings thrown down	De Maille, Hist. Gén. de la Chine, t. viii. p. 245.

1.	2.	3.	4.	
1058	Mesopotamia and Mosul	Lasted an hour .....	.....	Great damage done both to buildings
1059	Germany .....	.....	.....	.....
1060. April 7 (Easter-day).	Brescia	Several shocks.....	.....	..... Sigonius, p.
1061	In the East, probably, but no place is mentioned.	.....	.....	..... El Makin.
1062. Feb. 8.	Bâle, Constance, Neuf- chatel, and other parts of Switzerland.	.....	.....	Accompanied at Neufchatel and Constance by thunder and lightning.
1063	Syria, especially at Tri- poli.	Very violent .....	.....	The walls of Tripoli thrown down
1064. Sept. 23. About the second watch of the night.	In Thrace, especially at Constantinople; and also in Asia Minor, particularly at Cyzicus and Nicæa.	Exceedingly violent. The shocks were fre- quently repeated for two years, and ap- peared to proceed from the west.	.....	..... Joann. Scylitzæ Curopal, Breviar. Histor. p. 816, Paris edition; Zonaras, p. 274; Glycas, p. 325, &c.
1065. Mar. 27 (Easter-day).	In Germany .....	.....	.....	..... Calvisius.
1069	Syria, especially at Ram- la, in the south-west of Palestine; also in Egypt.	.....	The sea retired from the coast, leaving the shore dry, and then returned with such vehemence as to inundate the country.	..... Hadschi Chalifa; El Makin; Abul- fedâ.
1070. May 11.	Cologne and the country round.	.....	.....	..... Beuther quotes Chron. Univers.
1076. Throughout all England	.....	.....	.....	..... Matthew of Westminster, lib. ii. p. 6; Collection Académique; Dom Bouquet, &c.
.....	.....	.....	.....	..... Ditto.
.....	.....	.....	The frosts were very severe from November to April.	..... Ditto.

1081. Mar. 27. Throughout England; 1st hour of and also in Germany, especially at Mayence, and in Carniola.	Spain	Shocks lasting for many weeks.	Accompanied by subterranean noise. The date appears doubtful as respects Germany.	Polon. lib. ii. c. 20. Matthew Paris, t. i. p. 11; Matthew of Westminster, lib. ii. p. 8; Dom Bouquet; Simon Schard; Polydore Virgil; Beuther quoting Sigebertus and Massæus; Collection Académique, and many other chronicles. Die Mauren in Spanien Conde, übersezt v. Rutschmann, B. ii. p. 61.
1082, or 83 (?). Constantinople Dec. 6.			Many houses and churches thrown down.	Glycas, p. 333; Zonaras, p. 299; Cent. Magdeb. t. iii. p. 367.
1083. Mar. 21. Angers.			The second chronicle of St. Albin d'Angers gives the date 1082.	Dom Bouquet, t. xii. p. 479.
Oct. 18 Probably in central France. (In Poitou and Limousin ?) In England			A church is said to have been burned. Qu. by volcanic fire ?	Chron. S. Maxentii, Dom. Bouquet, t. xii. p. 402.
1085			Followed by great cold. Probably confounded with one of the preceding earthquakes.	Lycosthenes.
			A great pestilence is said to have prevailed in the western part of Lorraine, and this occurrence is coupled with the earthquake in an ambiguous sentence, from which one cannot distinctly learn whether the latter was felt there or not. Followed the next year by great floods.	Chron. Hirsaug, Chron. Turon., Dom Bouquet, t. xii. p. 465.
1086. In the Sicily; especially at Syracuse. evening.			At Syracuse a church fell at the time of vespers, and killed many people. Others give the dates 1070 and 1100.	Hermannus Gigas; Naclerus; Platina.
July 14. Soissons			"Cum aeris concussione"	Baronius, t. ix. p. 587; Trithemii Chron.
1087. Throughout la Puglia in Italy.				Romualdi Salernitanii Chron. t. vii. p. 176.
			Place not mentioned. Probably in the East.	Abulfeda, Ann. iii. p. 267.
1087 May 12. Thuringia and Hesse				Fabricius; Rivander, Düringische Chron. p. 210.
1088. Sept. 10. Throughout the Terra-di-Bari.				Anonymi Barenensis Chron. t. v. p. 154.

THE QUOTES IN CAPITALS ARE FROM THE

	2.	3.	4.	5.
1. Throughout la Puglia in Italy.				
2. Throughout all England.				
3. England				
4. Angers				
5. Constance and the shores of the lake of same name.				
6. Antioch and Damascus				
7. Place not mentioned.				
8. Probably in Germany.				
9. Venice				
10. Place not mentioned.				
11. Central France?				
12. Ditto				
13. Ditto				
14. Ditto				
15. Ditto				
16. Ditto				
17. Bâle				
18. England				
19. Houses were seen to leap upwards and return to their position. There was a great scarcity of fruits this year, and the harvest was not got in until the 30th November.				
20. Probably the same with the last				
21. Accompanied by great thunder and lightning.				
22. Great stones were thrown from the arches of the windows of the large tower of the church.				
23. The walls thrown down				
24. Accompanied by a great storm of wind				
25. Followed by a dreadful pestilence. Date should probably be 1695.				
26. "Caelum apparuit rubicundum"				
27. Ditto				
28. Ditto				
29. Bergans in v. Hoff's Chronik.				
30. Roger de Hoveden in <i>Baron Anglie</i> .				
31. Script. fol. 288.				
32. Baglivi, p. 542.				
33. Edinburgh Encyclopedia, Article Chronology, without quoting any authority.				
34. Chronicle Parvum, Muratori, t. iii.				
35. Simeon Dunelmensis, Hist. Ca.				
36. Collection Académique; Dom Bouquet, &c.				
37. Courrier Français of 27th Mar. 1843.				
38. Dom Bouquet, t. xii. p. 367. t. xiv. p. 79; Christ. Mathias, p. 582.				
39. Eberus in Calendario.				
40. Strada, Ann. iii.				
41. Simon Schard; Chron. Hirsau; Cent. Magd.; Dom Bouquet, t. xiii. p. 714.				
42. Vite de' Duchi di Venezia, Muratori, t. xii. p. 479.				
43. Chron. S. Maxentii; Dom Bouquet, t. xii. p. 403; Labbe, t. i. p. 214.				
44. Dom Bouquet, t. xii. pp. 403 and 484; Labbe, t. xv. pp. 215 and 281; Chron. S. Maxentii.				
45. Ditto.				
46. Ditto.				

1105. Dec. 24. Jerusalem	Probably Island of Malamocco near the Italian coast; also at Venice.	The island was engulfed by the sea during an earthquake.	Muratori does not mention the earthquake, and gives the date 1106.	Lycosthenes; Simon Schard, p. 132; Cent. Magd.; Muratori, &c.
1106. May 4. In the morning. Angers?	Ely in England.			Gentleman's Magazine, vol. for 1750, p. 56.
About 1107...	In Italy. Exact place not mentioned.		Houses and even hills thrown down	Dom Bouquet, t. xii. p. 486.
1109	Antioch			J. Malvecii Chron. loc. cit. p. 874.
1110. From morning to evening.	From Shrewsbury and Nottingham in England.		The earth opened and houses were swallowed up. The river Trent stopped for a mile in length, so that it could be passed with dry feet. This continued from morning until the third hour of the day.	Frytichius. Simeon Dunelmensis, Hist. X. Script. col. 251; apud Salopiam Chron. Henrici de Knyghton, X. Script. col. 2379.
1112. Jan. 3.	Lombardy Southern Germany; especially Rothenburg on the Necker.	Shocks for forty days	The town of Rothenburg was overthrown; Liège also was inundated by the waters of the Meuse.	Martène et Durand, t. v. p. 805. Lycosthenes; Frytichius; Collection Académique; Centuriæ Magdeburgenses; Münsterus, Cosmogr., lib. iii. Dom Bouquet, t. xii. p. 557.
1113. April 2.	"In partibus Britanniae." Query in England or in Brittany. Toledo			Jean de Ferréras, Histoire d'Espagne, t. iii. p. 324. Labbe, t. ii. p. 218.
1114	Italy; at a place called Villa Magnetrans. Jerusalem	Two earthquakes during the year.		Muratori, t. vii. p. 590.
1115. 25. Dec.	All Syria, and part of Asia Minor. Antioch and the country round. About Syria	Two separate earthquakes.	Trialeth, Mariscum, Manistria, and other towns were destroyed wholly or in part. Aleppo, Samosate, Jerusalem, Antioch, Haran, and Balasch were greatly injured. Possibly the same with the last.	Ch. Mathias, p. 587; Cent. Magdeb. t. xii. p. 863; Muratori, t. xxii. p. 484. Purchas, Pilgrimes, vol. ii. p. 1208; Collection Académique; Muratori, t. xii. p. 591. Bar Hebræus, p. 298; El Makin; Muratori; Ch. Mathias, &c.

1.	2.	3.	4.	5.	
.....	Sumatra and Java .....	.....	.....	These two islands, which before were one, experienced a violent earthquake, by which they were separated, and the Strait of Sunda formed. Accompanied in some places by thunder and lightning. The fact of there having been a great earthquake about this time is confirmed by almost all the chronicles, but they differ considerably from one another as to date and attendant circumstances.	Ramus, vol. ii. p. 232.
7. Jan. 3.	Upper Italy, Southern Germany, Switzerland, and Lisbon in Portugal.	According to some authors, lasted forty days.	.....	.....	Bernherz; Ragor; Bertrand; Collection Académique, and almost all the old chronicles.
— May 3.	Liège .....	.....	.....	Attended with thunder and lightning. Many storms of wind, thunder, &c. are mentioned by the chronicles as having occurred during this year.	Chronicle of Siebert.
— About December 1.	Lombardy	The shocks appear to have been very frequent about this time.	.....	.....	Henrici Huntingdoniensis lib. vii.
— 10. Middle of the night.	England? .....	.....	.....	The moon appeared the colour of blood	Matthew of Westminster, lib. ii. p. 29.
— 30. — 1118. June 4.	"En plusieurs lieux" .. Italy .....	.....	.....	.....	Dom Bouquet, t. xii. p. 276. Chron. Veronense, Muratori, t. viii. p. 621. Collection Académique.
—	Laybach and elsewhere in Carniola.	.....	.....	.....	Rerum Anglic. Script. fol. 272; Collection Académique; Simeon Dunelmensis.
1119. Sept. 28, 3rd hour of the day.	Different parts of England.	.....	.....	.....	Chron. S. Monast. Cassin. p. 492; Frytschius.
1120. First watch of the night.	Monastery of Montecassino in Italy.	.....	.....	.....	Cent. Magdeb.
—	"In valle Tridentina"	Seven, ten, and even twenty shocks felt each day.	.....	Great numbers of buildings ruined	Simon Schard, fol. 135; Dom Bouquet, t. xii. p. 782; Cent. Magd., &c.
— .....	.....ntioned.	.....	.....	.....	Abulfeda, Ann. iii. p. 413. Cod. Gothanæ No. 237.
— .....	.....	.....	.....	The temple at Mecca was injured by the shock .....	.....

1127	Tyre.....	.....	.....	The earth opened, and many people perished. Others give the date 1128.	The Chronicles of Rabbi Joseph ben Joshua ben Meir the Sphadi, t. i. p. 97. Comm. to M. Perrey by M. Rossignol, Secretary to the Academy of Dijon.
1128	Switzerland and elsewhere.	Shocks lasting at intervals for forty days.	.....	.....	Baronius; Collection Académique.
1129	Bagdad .....	.....	.....	.....	Bar Hebræus, p. 308.
1131	Laybach in Carniola .....	.....	.....	.....	Rapport de Vassali Kandi sur les tremblemens de terre du 2 Avril, 1808, p. 132.
1133. Aug. 4. In the morning.	In England	Very violent .....	.....	.....	Mathew of Westminster, lib. ii. p. 34; Matthew Paris, vol. i. p. 72; Polydore Virgil, p. 255; Simeon Dunelmensis.
.....	.....	.....	.....	.....	Chron. Fossæ Novæ, Muratori, t. vii. p. 869.
1134. Oct. 1. Middle of the night.	The coasts of England and the Netherlands.	No land shock felt	The sea rose suddenly with such violence as to inundate the country, and retired to its usual level as suddenly.	.....	Anselmi Gemblæ Appendix ad Sigbertum; Dom Bouquet, t. xiii. p. 270.
.....
1135	The city of Dogodoph in Armenia.	.....	.....	The city ruined...	Bar Hebræus, p. 312.
.....	Liguria in Italy	Violent shocks .....	.....	.....	Anonymi Cassinensis Chron.; Muratori, t. v. p. 62 and 141.
June 5	Bagdad .....	.....	.....	.....	Bar Hebræus, p. 314.
1136.	Würzburg	Twenty shocks .....	.....	During a storm of hail, thunder and lightning. A violent tempest three days afterwards. An eruption of Mount Vesuvius began on the 29th of May and lasted forty days.	Beuther quotes Lycosthenes. Anonymi Cassinensis Chron.; Muratori, t. v. p. 62 and 141.
.....	Syria and Mesopotamia, especially at Aleppo.	At Aleppo the shocks lasted more than two months.	.....	.....	Abulfeda, Ann. iii. p. 479.

1.	2.	3.	4.
9. Jan. 22. t the first rowing of he cock.	Beneventum		
140	In Hira, especially at the Peraian town Gansana, and also at Aleppo and Ambar. Place not mentioned. Probably in Italy. In the neighbourhood of Kalunikus.	The town Gansana was destroyed, 100,000 per- sons losing their lives. Black water came out of the earth at this place.	Hadachi Chalifa; Abulfeda, p. 329; El Makin; Bar Hebraeus, &c.
1142. Dec.	Lincoln	No shock said to be felt. The earth opened and swallowed up forty horsemen, whose cries were heard long after (!).	Cass. Chron.; Muratori, t. v. p. 64 and 141. Bar Hebraeus, p. 323.
1143	Rouen	Three shocks during the same day.	Simeon Dunelmensis, Col. 268; Col- lection Acad.
About 1144...	Rome	This earthquake is not mentioned in the Rouen Chronicle.	Breve Chron. L'itienais Camobii; Dom Bouquet, t. xii. p. 774. Baglivi, p. 543. Matthew Paris, t. ii. p. 634.
1146	Paphos and several other islands in the Medi- terranean. At Mayence. Also in Switzerland, Portugal (especially at Lisbon), and other parts of Europe.		Chron. Hirsingense; Balbi, Essai sur le Royaume de Portugal; Ber- trand; Cent. Magd.
1151, or 1152	Italy	At Mayence fifteen shocks were felt during one day and night. Great and numerous earthquakes.	Cassinensis Chron., Muratori, t. v. p. 66 and 142; Simon Schard; Lycosthenes; Cent. Magd.
Feb. 15	In Burgundy	A castle near Cluniacum was swallowed up, and a pool of water of great depth appeared in its place. Authors differ somewhat as to the date of the year. From being reported by the same author who men- tions the last, one would be led to suppose them different events; yet the circumstances are so	Roberti de Monte append. ad Sige- bert.; Dom Bouquet, t. xiii. p. 297. Ditto. Also Chron. Turon.; Chron. Cluniacense, &c.

1157	During Italy and Sicily (During winter?).	Antioch, Damascus, and Tripoli.	Spain	5000 persons lost their lives in Sicily	Beuther quotes Vincent, lib. xlix. c. 3; Chron. Martini Poloni; Fascic. temporum, &c. Ditto.
1158		Syria, &c.	At Malatia it was felt in the direction S. to N.	2000 persons killed.	Edinburgh Encyclopædia, Article Chronology.
1159		London and other parts of England.		20,000 persons perished, and Antioch, Tripoli, Damascus, Aleppo, and many other towns were ruined. Other authorities give the dates 1159 and 1160.	Bar Hebreus, p. 348; Nicetas Choniates; Cent. Magd., &c.
1160	Oct. 15	Sicily	Very violent	The Thames dried up, so that it could be passed dryshod.	Chron. Gervasi Dorobornensis; Coll. Académique; Révolutions du Globe. Mémoires de Chronol. t. ii. p. 911. No ancient authority given.
1161	Jan. 1. first hour.	Village of Coutances in the territory of St. Lo in Normandy.		Robertus de Monte gives the date 1160	Kämpfer, v. Dohn, t. i. p. 222. Chron. Fosse Novæ, Muratori, t. vii. p. 872.
1162	At dawn.	16. Ceccano in Italy			Simon Schard, f. 147; Lycosthenes; Cent. Magd.
1163	Aug. 2	The southern part of Iceland.			Chron. Fosse Novæ, Muratori, t. vii. p. 872.
1164	Jan. 25.	Southern part of Iceland.			Voyage en Island, publié sous la direction de M. Gaimard, p. 313; v. Hoff.
1165	Jan. 26.	In the counties of Ely (?), Norfolk and Suffolk.		Persons who had been standing were thrown down, and the bells were made to ring. One chronicle gives 1164 as the year.	Chroniques de Saumur et d'Angers; Dom. Bouquet, t. xii. p. 482; Martène et Durand, t. v. p. 1145; Labbe, t. i. p. 279.
1166	June 20	Most probably in Anjou			Voyage en Island, p. 313; v. Hoff. Matthew of Westminster, lib. ii. p. 47; Matthew Paris, t. i. p. 104.
1167					Chron. S. Florentii Saumur, Dom. Bouquet, t. xii. p. 491; Martène et Durand, t. v. p. 1145.

1.	2.	3.	4.	5.	6.
1165. 1168. Jan. 10 At Pisa	South of Iceland..... At Pisa .....	..... .....	..... .....	..... Accompanied by considerable subterranean noise. From the 8th to the 20th the Arno was frozen over, so that horsemen could pass over the ice. Instead of "terremotus maximus cum mugitu," Muratori writes "tonitruius fortis cum mugitu." Hence perhaps this does not refer to an earthquake at all. Catania and other towns ruined, and 15,000 people killed. Others give the dates 1170, 1173, 1175, and even 1183. Doglioni reports it in 1166, and adds that it was felt in Greece.	Voyage en Island, p. 313; v. Hoff. Bernardi Marangonis vetus Chron. Pisanum, nell' Archivio storico Italiano, t. vi. part ii. p. 50.
1169. Feb. 4, Sicily and part of Calabria. or 5.	Sicily and part of Calabria.	.....	.....	.....	Baronius, t. xii. p. 604; Muratori, t. vi. p. 588; Martène et Durand, &c.
— Feb. 18, Toledo and other parts or 20.	Toledo and other parts of Spain.	.....	.....	.....	Mariana, Historiæ de rebus Hispanicis libri xxx. lib. xi. c. 10; Jean de Ferreras, Histoire d'Espagne, t. iii. p. 483.
1170. May 9 Ceccano in Italy	Ceccano in Italy .....	.....	.....	The greater part of the walls of the town thrown down. The bells sounded of themselves for ten days. Exceedingly violent. Great damage done to both life and property.	Chron. Fossæ Novæ, Muratori, t. vii. p. 874.
— June 29 In Syria. Also felt in Hungary, Germany, Switzerland, Sicily, and the north coast of Africa.	In Syria. Also felt in Hungary, Germany, Switzerland, Sicily, and the north coast of Africa.	Recurring at intervals for fifteen days, or according to others for twenty-five.	.....	.....	Hadschi Chalifa; Abulfeda; Robertus de Monte; Bar Hebræus; Dom Bouquet, t. xii. p. 345; and many other chronicles.
1172. Probably either Jan. 13, or July 7.	Place not mentioned. Probably near the monastery of Monte Cassino in Italy.	.....	.....	Accompanied by an eclipse of the moon. The latter phenomenon occurred this year on the two days mentioned.	The Cassinensis Chron., Muratori, t. v. p. 69.
—	In the East. Probably Syria, or Asia Minor.	.....	.....	.....	Collection Académique.
1173	Catania .....	.....	.....	Perhaps confounded with the great earthquake of 1169.	Edinburgh Encyclopædia, Article Chronology. Chron. di Bologna, Muratori, t. xviii. p. 243.
1174. Aug. 17. At dinner hour (!).	Bologna? .....	.....	.....	.....	.....
1179 (or 1180). Aug. 1. In the watch of	Place not mentioned .....	.....	.....	.....	Chron. Saxonicum, Dom Bouquet, t. xiii. p. 723; Chron. Lamberti Parvi: Martène et Durand. t. v.

1180.	About Sept. 29.	In England	Two or three shocks		far that three new pools of water appeared where the rising had been.	Simon Schard, f. 163; Lycosthenes.
1180		Naples			The town of Arrian was swallowed up	Bertrand, 2 ^e Mém. p. 32; Mercure Hist. et Polit. t. xiv. p. 261.
1182		In Switzerland			Followed by storms of wind and rain	Bertrand, p. 32.
1183		Syria and Judæa.			Very many buildings, &c. overthrown	v. Hoff; Collection Académique.
		Switzerland			Antioch, Damascus, and Tripoli, all partly ruined.	Bertrand, p. 32.
		Syria			More than 20,000 victims. Possibly founded with one of the former earthquakes in the same country.	Muratori, t. ix. p. 178; Philippi Bergomat, Suppl. Chron. fol. 291.
1184.	Beginning of Jan.	Verona.....			The exterior of the amphitheatre thrown down. A Verona chronicle gives the date of this event 1183.	Muratori, t. vii. p. 47; Sigonius, pp. 826, 827.
	May 24	Calabria			In March of this year Vesuvius threw forth ashes for several days.	Chron. Cassin., Muratori, t. v. p. 70.
1185.	April 15, 16, or 17.	All England, especially at Lincoln.			The cathedral of Lincoln and many other buildings were thrown down. Baker's English Chronicle gives the date 1180, April 25.	Dom Bouquet, t. xvii. p. 465, t. xviii. pp. 60, 188, 328; Martène et Durand; Rerum Anglic. Script., &c. Siccardi Chron., Muratori, t. vii. p. 602.
		In Italy			The author calls it in one place "non modicus," and lower down "modicus."	
1186.	March	In a country called Ucericum, or Uceticum in Gothia. According to another author, in Greece.			Followed in April by an eclipse of the moon. The date should probably be 1185.	Chron. de St. Denis, Dom Bouquet, t. xviii. p. 362; Lycosthenes, &c.
	Begin-ning (after the middle of the septem-ber).	Almost universal in Europe; especially in England, Calabria, and Sicily.			In England houses were thrown down, and in Calabria and Sicily many towns ruined.	Matthew Paris, t. i. p. 144; Matthew of Westminster, lib. ii. p. 59; Collection Académique; Cent. Magd., &c.
		Verona.....			Perhaps only the same with the one in 1184 ...	Chron. Gervasii Dorobernenais in Script. Col. X. 1505.

1.	2.	3.	4.	5.	6.
1189	Rome .....	.....	.....	.....	Bagivi, p. 543.
1198. May 4	Village of Longaw in Bohemia.	The shocks recurred for fourteen months after.	.....	Great number of buildings thrown down	Lycosthenes and Frytschius.
1199. May 3. Noon.	Poland. Also felt at Constantinople.	The shocks lasted several days.	.....	Others mention 1200 as the year in which this earthquake occurred. Very probably only the same with the last.	Cent. Magd. p. 877; Diarium Hist. p. 134.
.....	In England; principally in Somersetshire.	.....	.....	Persons were thrown from their feet in some places.	Ymagin, Hist. Radulfi de Diceto. Col. 709; Révolutions du Globe, &c.
1200	Ceccano .....	.....	.....	.....	Chron. Fosse Novæ, Muratori, t. vii. p. 886.
1201. Jan. 9	York and the neighbourhood.	.....	.....	Accompanied by noise	Rerum Anglic. Script. fol. 464.
— May 22. About the 6th hour of the day.	In the counties of Somerset (Suffolk?) and Norfolk.	.....	.....	Persons were thrown from their feet	Dom Bouquet, t. xvii. p. 660.
— or 1202	Syria, Palestine, Mesopotamia, &c. Also felt in Cyprus.	.....	.....	Many towns greatly injured. Some authors (not Arabian) give the date 13th, or 20th, or 30th May 1202.	Hadschi Chalifa; Abulfeda, Ann. iv. p. 195; Bar Hebræus, p. 435.
1202	Different parts of England.	.....	.....	.....	Dom Bouquet, t. xviii. p. 97.
1204	Egypt, Syria, Mesopotamia, Irak, Asia Minor, Cyprus and Sicily.	.....	.....	The walls of Tyre thrown down	Abulfeda, Ann. iv. p. 211; Abulfaradsch, p. 405.
—	Java .....	.....	.....	The small island of Bali, which before formed part of the island of Java, was separated from it by this earthquake.	Raffles's History of Java, vol. i. p. 95, and vol. ii. p. 232.
1207. Feb. 26. Midnight.	In Anjou? .....	.....	.....	Accompanied by loud peals of thunder	Addenda Chron. Andegav. S. Albini, Dom Bouquet, t. xviii. p. 327.
1208. June 13	In Aquitaine .....	.....	.....	.....	Dom Bouquet, t. xviii. p. 273.
.....	In Nisabur and Choratan .....	.....	.....	.....	Bar Hebræus, p. 452.
.....	Antioch .....	.....	.....	.....	Cent. Magdeb. p. 600.
.....	Venice .....	.....	.....	Buildings were thrown down	Cent. Magdeb; Sabellicus, Decas l. lib. viii.
.....	.....	.....	.....	.....	Cent. Magdeb. p. 630.

Total during six

1214. Dec. 20. At night	In Normandy?	Three shocks			Chron. Mortui-Maris, Chron. Rotomag, Dom. Bouquet, t. xviii. pp. 356 and 361.
1215. Mar. 3. Midnight.	In Burgundy, or Limousin?				Chron. Cluniac. Cenobii, Dom Bouquet, t. xviii. p. 743.
1217. Jan. 8. At dinner	At Genoa.	Lasted a short time.			Caffari, Annales Genuenses, Muratori, t. vi. p. 412.
1218. hour (!). In winter.	In England				Cent. Magdeb.
About 1218.	In Franche Comté			No shock felt, but a mountain opened and swallowed up 5000 men. Possibly not an earthquake. The dates given for this event vary very much.	Collection Académique, t. vi. p. 524, quoting Nauclerus.
1219	In England				Beuther quotes Polydor. lib. xvi.
—	In the southern part of Iceland.		Accompanied by a submarine eruption off the coast at Näs Repp.		v. Hoff; Voyage en Island, p. 313.
1221	In England			Perhaps only the same with the last two earthquakes mentioned for this country.	Lycosthenes.
1222. At dinner	Ang. Bologna			A comet seen at the same time.	Muratori, t. iv. p. 109.
hour. Dec. 25. to 1223, Jan. 11.	Italy, Lombardy, the Tyrol, Germany and Cyprus; especially at Cologne and Brescia.	Shocks during the time mentioned.		The dates given for this event are very confused, but the one here given seems the best supported. The shocks were probably not all felt at each of the places mentioned.	Trithemius, Chron. Hirsaugiense; Baronius; Sigonius; Dom Bouquet, &c.
1223. Midnight.	Apr. 21. Cremona, Brescia, &c. in Italy.	Many shocks.		A rain of sand of the colour of blood is also mentioned.	Ant. Campo, Hist. di Cremona, p. 46; Dom Bouquet, t. xviii. p. 116; Sigonius, p. 228.
1224. Nov. 15. 9 o'clock.	Barcelona				Chronol. Barcinon, Marca Hispanica, p. 755.
1227. Winter.	In Territory of the Salviè (now Pays d'Aix in the Département des Bouches du Rhône).			5000 persons killed by the masses of rock which fell from the mountains.	Lycosthenes, p. 433; Baronius, t. xiii. p. 272; Aventinus, &c.
1228. July	Monte Mola in Italy			No shock mentioned, but the mountain is said to have fallen and killed 700 people. Perhaps only a landslip.	Richardi de S. Germano Chron., Muratori. t. vii. p. 1006.

1.	2.	3.	4.	5.	6.
1230. April 5.	Reggio in Calabria .....	.....	.....	From the 1st to the 15th March subterranean bellowings (mugissements) had been heard throughout all Calabria.	G. Fiore, Calabria Illustrata, p. 286.
—	In Bohemia .....	.....	.....	At the same time part of Holland was inundated.	Hist. Bohemica, lib. xv.; Rerum Bohemic. Fréher, p. 124.
1231. June 1.	Monastery of St. Germain. The earthquake extended from Capua to Rome.	The shocks continued at intervals for more than a month afterwards.	.....	The fountains were troubled, and the water remained salt for two hours, and exhaled a foetid odour.	Richardi de S. Germano Chron.; Muratori, t. vii. p. 1026; Baglivi, p. 542.
1233	In Burgundy .....	.....	.....	.....	Frytschius.
1236	Laybach in Carniola .....	.....	.....	Followed by a most abundant year	Vassali—Eandisur les Tremblemens de Terre du 2 Avril 1808, p. 132; Collection Académique.
1240	Guldbringe Syssel in Iceland.	.....	A submarine eruption at the same time near Reikia Näss.	.....	v. Hoff.
1242. Oct. 24.	Vicenza?	Very violent .....	.....	.....	Ant. Godi Chron., Muratori, t. viii. p. 86.
In the evening.	.....	.....	.....	.....	Annales Ptolomæi Luccensis, Muratori, t. xi. p. 1281.
1244	Lucca	Three earthquakes .....	.....	Buildings of various kinds thrown down	Chron. Neritinum, Muratori, t. xxiv. p. 897.
1245	Nardo (province of Otranto) in Italy.	.....	.....	.....	Higden's Polychronica; Fabyan's Chronicle; Camden, &c.
1246. June 1; 9th hour.	England, especially in Kent.	.....	.....	v. Hoff gives the 19th May as the day on which this earthquake took place.	Petri Justiniani Hist. Venetor. lib. iii.
—	Island of Candia .....	.....	.....	The walls of the town Canea thrown down	Matthew Paris, t. ii. p. 723; Collection Académique, &c.
1247. Feb. 13.	Different parts of England, (especially London,) bordering on the Thames.	.....	.....	.....	.....
1248. Nov. 5	Naples	Very violent .....	.....	.....	Ephemerides Neapolitanæ, Muratori, t. vii. p. 1065.
—	.....	.....	.....	The Cathedral of Wells was much injured. It was remarked that the summits of the buildings were violently shaken, whilst their foundations were not.	Matthew Paris, t. ii. p. 756; Polydore Virgil, p. 397; Lycosthenes; Bertrand.
Dec. 21.	In England, in the diocese of Bath and Wells. Also felt in Piedmont and Savoy, and in Syria.	.....	.....	No shock recorded. The mountain parted and one part fell, destroying a monastery at its foot, and many villages round. Perhaps only a landslide.	De Saussure, Voyage dans les Alpes. No. 1181. t. iii. p. 18, on the authority of a misal at Mont St. Jean.
1249. Nov. 24. Midnight.	The abysses of Mians, half a league from Chambery.	.....	.....	.....	.....

1253. Nov. 25. At night.	Chilterns (Hertford). Throughout the kingdom of Naples.	Terrible shocks for three days. The direction was nearly the same as that of 1158, viz. S. to N.	Extraordinary motion of the water of the rivers and lakes, which alternately inundated the country beyond their usual level, and retired considerably below the same.	Many thousand persons perished. A lake was formed in Natolia.	p. 803. Ephemerides Neapolitanæ, Muratori, t. vii. p. 1077. Collection Académique, t. vi. p. 526.
— In summer.	Lombardy			No land-shock felt. There was no wind at the time.	Jacobi Malvecii Brixienſe Chronicon, Muratori, t. xiv. p. 922.
1256. Sept.	Rome and Agnano			At Rome the bell of St. Sylveſter ſounded of itſelf.	D'Acheri, t. xi. p. 546; Duchêne, Histoire des Gaules, t. v. p. 362. Gentleman's Mag. vol. lvii. p. 175; Gazette de France of 14th April 1786.
1257	Poland				M. Cromeri de reb. Polon. p. 159; Annales Sileſiæ, p. 82, &c.
1258	Ditto				Kämpfer v. Dohm, p. 222. Chron. Cavense, Muratori, t. vii. p. 928.
— Oct. 4 In Italy. Exact place not ſpecified.	Japan				Ditto.
1259.	Trapani in Italy			The ſmall iſlands now called Gilingan and Travangan were ſeparated by this earthquake from the northern ſide of the iſland of Java.	Raffles's History of Java, vol. i. p. 25; and vol. ii. p. 232.
1260	Java				v. Hoff; Voyage en Iſland, p. 313.
— and 1261	The little iſland of Flatey, in Breidaford, Ice-land.				J. Malvecii Chron., Muratori, t. xiv. p. 938.
1264	Brescia			A comet viſible at the ſame time	Ephem. Neapol., Muratori, t. vii. p. 1103.
Apr. 10	Bari, in Italy			The date 21ſt March 1266 is alſo given, Palm Sunday being the day mentioned by the chronicle.	
1267.					

1.	2.	3.	4.	5.
268. Night, between the 1st and 2nd Nov.	Modena, and elsewhere in Italy.			Annales veteres Mutinenses, Muratori, t. xi. p. 70.
Nov. 3 Padua or 4. Middle of the night.		Two great shocks		Regimina Padua, Muratori, t. viii. p. 379; Monachi Patavini Chron., Muratori, t. viii. p. 730.
	Kingdom of Naples, at the lake Celano.			Leander and Albertus Bononiensis.
1273. Beginning of Mar.	In Cilicia Durazzo	The movement was at first oscillatory, and afterwards appeared as if the surface of the earth were alternately contracted and dilated with great violence.		Abulfaradsch, p. 572. Pachymeris Hist. i. lib. v. c. 7. pp. 242 and 537.
	Azerbidschan and Tabriz in Persia. Also in Thrace.			Bar Hebraeus, p. 548; Cent. Magd.
1274. Dec. 5	Throughout England			Matthew of Westminster, p. 363; Polydore Virgil, p. 414.
	Pays de Galles			Polydore Virgil, loc. cit.; Fascic. temporum.
1275. Sept. 11. Between the 1st and 3rd hours of the day.	In England			Matthew of Westminster, p. 364.
	S. Damiano in Pied-			Chron. Astense, Muratori, t. xi. p. 163. Caffari, Annales Genuenses, Muratori, t. vi. p. 566.
				The walls and other buildings were thrown down, Bar Hebraeus, p. 553.

1278. April 24.	Italy. April Venice, and almost all the rest of Italy.	Very violent. Recurred again on the 30th.	Other authorities place this event in 1279, giving the same days and month, while others again mention it on the 1st of May.	Andreas Danduli Chron., Muratori, t. xii. p. 397; Vite de' Duchi di Venezia, p. 571.
1280	In France and England The island Sumbava near Java.		The little island Selo Parang was produced by this earthquake, being separated by it from the island of Sumbava.	Polydore Virgil, lib. xvi.
1282. Jan. 17.	At Venice		The date 1283 is also given	Raffles's History of Java, vol. i. p. 25, and vol. ii. p. 232.
Hour of vespers.	Gap in Dauphiny			Vite de' Duchi di Venezia, p. 574.
1283.	In the neighbourhood of Naples. At Mtskitha in the Caucasus.	The earthquake began on Thursday, recurred on Friday and Saturday, and again occurred on Easter Sunday.	The cathedral of Mtskitha fell into ruins	v. Zach, Correspondance Astronomique, t. vi. p. 32. Johann de Oppido; Cent. Magdeb.
1284	In England			Philadelphine sur les tremblemens de terre dans le Caucase.
1285. Dec. 13.	Ferrara in Italy			Collection Académique. Chron. Estense, Muratori, t. xv. p. 339.
	In the East. Particular locality not specified; said to be widely extended.			Abulfaradsch.
1286. before the 8th Oct.	Some in Brittany, especially at Vannes.	Lasted forty days. The shocks recurred at intervals for a year.		Morice, Histoire de Bretagne, t. i. col. 31.
1287. July 15.	Rome "Per universum orbem terrarum."	Several shocks		Cent. Magdeb. Ditto.
1289.	France Pistoia in Italy	Violent shocks, which continued a long time.	This event and the last two probably happened at the same time.	Mémorial de Chron. t. ii. p. 912. Ann. Ptolomæi Luccensis, Muratori, t. xi. p. 1298.

1.	2.	3.	4.	5.	6
1290	Nearly universal in Europe. Felt most violently in Iceland, Switzerland, and at Lisbon; especially at the last of these.	.....	.....	Probably all these earthquakes in various places did not occur at the same time of the year.	Bertrand; Collection Académique; Voyage en Island, &c.
1292	Rome .....	.....	.....	.....	Baglivi, p. 542.
.....	Borgo-S-Sepolcro .....	.....	.....	.....	Sarti, c. 3.
1293. July 10 and 11.	Parma and Pistoia	Many violent shocks. At Pistoia they recurred for 24 days.	.....	Accompanied by violent storms of wind	Chron. Parmense, Muratori, t. ix. p. 825.
—	In Spain .....	.....	.....	.....	Palassou, Nouveaux Mémoires sur les Pyrénées, Pau, 1823.
1294	Iceland .....	.....	.....	An eruption of Hecla began at this time, and during the six following years the volcano was never altogether inactive.	v. Hoff.
1295. Sept. 4. About noon.	In the bishopric of Tours. Also in the Rhetic Alps, and at Constance.	Probably lasted several days.	.....	In the Rhetic Alps fifteen castles were destroyed.	Epitome Mundi; Cent. Mag.; Lycosthenes; Diarium Hist.; Eberus.
1296. June 1. Middle of the night.	Constantinople	Several shocks .....	.....	.....	Nicephori Gregoræ Hist. Byzant. lib. vi. c. 9. p. 124; Pachymeria, l. lib. v. c. 7. p. 158.
1298. Jan. 5. At twilight.	In England .....	.....	.....	.....	Matthew of Westminster, p. 412.
— Nov. 30	Spoletto, Reati, and Pistoia in Italy.	Shocks lasting for several days.	.....	Others give the dates 1295, and 1300	Giovanni Villani, lib. vii. c. 25, Muratori, t. xiii. p. 361; Martène et Durand; Labbe, &c.
1299	In Germany .....	.....	.....	.....	Edinburgh Encyclopedia, Article Chronology.
End of the 13th century.	Karakorum (Holin, or Khorin) in central Asia.	.....	.....	This place was destroyed	v. Humboldt, Asie Centrale, t. ii. p. 110.
1300. Dec. 28.	Country around Mt. Hecla in Iceland.	.....	.....	Hecla had been in eruption for some time before.	v. Hoff.
—	Throughout Italy	Many violent shocks.	.....	.....	Ant. Campo, Hist. di Cremona, p. 84.
1301. June 11. At dawn, about noon, after vespers, and about	Place not mentioned. Somewhere in Italy.	Four shocks, at the hours mentioned.	.....	.....	Fragmenta Hist. Forojuliensta, Muratori, t. xxiv. p. 1208.

1301. Nov. 30	In Italy. Felt but slightly at Venice.						Vite de' Duchi di Venezia, <i>loc. cit.</i> p. 582. Collection Académique.
1302	At Riette (Rieti?) in Italy.						
1303. Aug. 8.	Alexandria and Acre, throughout the Peloponnesus, Candia, and all the Adriatic Sea. Felt but little at Venice.						Hadschi Chalifa; Abulfeda, v. p. 191; Vite de' Duchi di Venezia, <i>loc. cit.</i> p. 772.
1304. Oct. 23	In Poland						Gentleman's Magazine, vol. lvii. p. 175; Gazette de France, 14 Avril, 1786.
1306?	Some time after the earthquake in Candia.						Chron. Estense, Muratori, t. xv. p. 351; Chron. Placent., Muratori, t. xvi. p. 485.
1307. In the 8th month.	Japan						Ricobaldi Ferrar Chron., Muratori, t. ix. p. 254.
1311	Laybach in Carinthia						Kämpfer (v. Dohm), p. 229.
1316. Sept.	At St. Denis in France						Vassali—Eandi sur les tremblemens de terre du 2 Avril 1808, p. 132.
1317. Dec.	In Italy						D'Acheri, Spicilegium, t. xi. p. 667.
1318. Sept.	At Cologne						Martène et Durand, t. v. p. 561.
Nov. 14.	In England						Acta Trevir. Archiepisc.; Martène et Durand, t. v. p. 407.
1319	In the provinces of Ararat and Sini in Armenia.						Thom. Walsingham, Hist. Angl.; Camden, Angl. Norm., p. 111; Collection Académique.
1320. Dec. and	Oct. Sienna in Italy						Dubois de Montpéroux, Voyages autour du Caucase, t. v. p. 287; Chakathouno, t. ii. p. 19.
1321 May 25	Rome						Chron. Sanese, Muratori, t. xv. p. 62.
1322. June 1. or	In Germany						Edinburgh Encyclopædia, article Chronology.
	Exceedingly violent.						Baglivi, p. 542.
	Venice was inundated.						Lycosthenes; Diarium Hist. p. 158.

1.	2.	3.	4.	
April 5.	Reggio in Calabria .....	.....	.....	From the 1st to the 15th March subterranean bellowsings (mugissements) had been heard throughout all Calabria.
.....	In Bohemia .....	.....	.....	At the same time part of Holland was inundated.
1. June 1.	Monastery of St. Germain. The earthquake extended from Capua to Rome.	The shocks continued at intervals for more than a month afterwards.	.....	The fountains were troubled, and the water remained salt for two hours, and exhaled a fetid odour.
33	In Burgundy .....	.....	.....	.....
36	Laybach in Carniola .....	.....	.....	Followed by a most abundant year
240	Guldbringe Syssel in Iceland.	.....	A submarine eruption at the same time near Reikia Näs.	.....
1242. Oct. 24.	Vicenza?	Very violent .....	.....	.....
In the evening.	.....	.....	.....	Ant. Godi Chron., Muratori, t. viii. p. 86.
1244	Lucca	Three earthquakes .....	.....	Annales Ptolomæi Luccensis, Muratori, t. xi. p. 1281.
1245	Nardo (province of Otranto) in Italy.	.....	.....	Chron. Neritinum, Muratori, t. xxiv. p. 897.
1246. June 1; 9th hour.	England, especially in Kent.	.....	.....	Higden's Polychronica; Fabyan's Chronicle; Camden, &c.
.....	Island of Candia .....	.....	.....	Petri Justiniani Hist. Venetor. lib. iii.
1247. Feb. 13.	Different parts of England, (especially London,) bordering on the Thames.	.....	.....	Matthew Paris, t. ii. p. 723; Collection Académique, &c.
1248. Nov. 5	Naples	Very violent .....	.....	Ephemerides Neapolitanæ, Muratori, t. vii. p. 1065.
.....	In England, in the diocese of Bath and Wells.	.....	.....	Matthew Paris, t. ii. p. 756; Polydore Virgil, p. 397; Lycosthenes; Bertrand.
.....	.....	.....	.....	De Saussure, Voyage dans les Alpes. No. 1181. t. iii. p. 18, on the authority of a missal at Mont St.

[illegible]

1.	2.	3.	4.	5.	6.
1268. Night, between the 1st and 2nd Nov.	Modena, and elsewhere in Italy.	.....	.....	.....	Annales veteres Mutinensium, Muratori, t. xi. p. 70.
— Nov. 3	Padua	Two great shocks .....	.....	.....	Regimina Paduæ, Muratori, t. viii. p. 379; Monachi Patavini Chron., Muratori, t. viii. p. 730.
Or 4. Middle of the night.	Kingdom of Naples, at the lake Celano.	.....	.....	This earthquake, and the last two probably took place at the same time, although the dates are not exactly concordant.	Leander and Albertus Bononiensis.
—	In Cilicia .....	.....	.....	60,000 persons were killed.	Abulfaradsch, p. 572.
1273. Beginning of Mar.	Durazzo	The movement was at first oscillatory, and afterwards appeared as if the surface of the earth were alternately contracted and dilated with great violence.	.....	Preceded by subterranean noises for some time, which gradually increased in intensity up to the time of the earthquake.	Pachymeris Hist. i. lib. v. c. 7. pp. 242 and 537.
—	Azerbidschan and Tabriz in Persia. Also in Thrace.	.....	.....	.....	Bar Hebræus, p. 548; Cent. Magd.
1274. Dec. 5	Throughout England .....	.....	.....	Accompanied by thunder and lightning, a comet, and a <i>fiery dragon</i> .	Matthew of Westminster, p. 363; Polydore Virgil, p. 414.
—	Pays de Galles .....	.....	.....	Accompanied by a <i>rain of blood</i> .	Polydore Virgil, <i>loc. cit.</i> ; Fascic. temporum.
1275. Sept. 11. Between the 1st and 3rd hours of the day.	In England .....	.....	.....	Many of the most famous churches of England thrown down or injured; among others that of St. Michel-du-Mont near Glaston.	Matthew of Westminster, p. 364.
—	At S. Damiano in Piedmont.	.....	.....	.....	Chron. Astense, Muratori, t. xi. p. 163.
1276. July. At sunset.	Genoa .....	.....	.....	.....	Caffari, Annales Genuenses, Muratori, t. vi. p. 566.
—	Arcastia, in the province of Argisch; also at Cilath.	At Cilath the shocks lasted nine hours.	.....	The walls and other buildings were thrown down, and many lives lost.	Bar Hebræus, p. 553.
— .....	.....	.....	.....	.....	Diarium Hist. p. 148.

1278. April 24.	Italy. Venice, and almost all the rest of Italy.	Very violent. Recurred again on the 30th.	.....	Other authorities place this event in 1279, giving the same days and month, while others again mention it on the 1st of May.	terremoti, c. 3. Andreas Danduli Chron., Muratori, t. xii. p. 397; Vite de' Duchi di Venezia, p. 571. Polydore Virgil, lib. xvi.
1280	In France and England The island Sumbava near Java.	.....	.....	The little island Selo Parang was produced by this earthquake, being separated by it from the island of Sumbava.	Raffles's History of Java, vol. i. p. 25, and vol. ii. p. 232.
1282. Jan. 17.	At Venice	.....	.....	The date 1283 is also given	Vite de' Duchi di Venezia, p. 574.
Hour of vessels.	Gap in Dauphiny	.....	.....	.....	v. Zach, Correspondance Astronomique, t. vi. p. 32.
.....	In the neighbourhood of Naples.	.....	.....	.....	Johann de Oppido; Cent. Magdeb.
1283. Easter.	At Mtskhitha in the Caucasus.	The earthquake began on Thursday, recurred on Friday and Saturday, and again occurred on Easter Sunday.	.....	The cathedral of Mtskhitha fell into ruins	Philadelphine sur les tremblemens de terre dans le Caucase.
1284	In England	.....	.....	.....	Collection Académique.
1285. Dec. 13	Ferrara in Italy	.....	.....	.....	Chron. Estense, Muratori, t. xv. p. 339.
.....	In the East. Particular locality not specified; said to be widely extended.	.....	.....	.....	Abulfaradsch.
1286. Some time before the 9th Oct.	In Brittany, especially at Vannes.	Lasted forty days. The shocks recurred at intervals for a year.	.....	.....	Morice, Histoire de Bretagne, t. i. col. 31.
1287	Rome	Several shocks.	.....	.....	Cent. Magdeb.
1289.	"Per universum orbem terrarum."	.....	.....	.....	Ditto.
.....	France	.....	.....	.....	Mémorial de Chron. t. ii. p. 912.
.....	Florence in Italy	Violent shocks, which continued a long time.	.....	This event and the last two probably happened at the same time.	Ann. Ptolomæi Luccensis, Muratori, t. xi. p. 1298.

1.	2.	3.	4.	5.	6.
1290	Nearly universal in Europe. Felt most violently in Iceland, Switzerland, and at Lisbon; especially at the last of these.	.....	.....	Probably all these earthquakes in various places did not occur at the same time of the year.	Bertrand; Collection Académique; Voyage en Island, &c.
1292	Rome .....	.....	.....	.....	Baglivi, p. 542.
.....	Borgo-S-Sepolcro .....	.....	.....	.....	Sarti, c. 3.
1293. July 10 and 11.	Parma and Pistoia	Many violent shocks. At Pistoia they recurred for 24 days.	.....	Accompanied by violent storms of wind	Chron. Parmense, Muratori, t. ix. p. 825.
—	In Spain .....	.....	.....	.....	Palassou, Nouveaux Mémoires sur les Pyrénées, Pau, 1823.
1294	Iceland .....	.....	.....	An eruption of Hecla began at this time, and during the six following years the volcano was never altogether inactive.	v. Hoff.
1295. Sept. 4. About noon.	In the bishopric of Tours. Also in the Rhetic Alps, and at Constance.	Probably lasted several days.	.....	In the Rhetic Alps fifteen castles were destroyed.	Epitome Mundi; Cent. Mag.; Lycoathenes; Diarium Hist.; Eberus.
1296. June 1. Middle of the night.	Constantinople	Several shocks .....	.....	.....	Nicephori Gregoræ Hist. Byzant. lib. vi. c. 9. p. 124; Pachymeria, 1. lib. v. c. 7. p. 158.
1298. Jan. 5. At twilight.	In England .....	.....	.....	.....	Matthew of Westminster, p. 412.
— Nov. 30	Spoletto, Reati, and Pistoia in Italy.	Shocks lasting for several days.	.....	Others give the dates 1295, and 1300	Giovanni Villani, lib. vii. c. 25, Muratori, t. xiii. p. 361; Martène et Durand; Labbe, &c.
1299	In Germany .....	.....	.....	.....	Edinburgh Encyclopedia, Article Chronology.
End of the 13th century.	Karakorum (Holin, or Khorin) in central Asia.	.....	.....	This place was destroyed	v. Humboldt, Asie Centrale, t. ii. p. 110.
1300. Dec. 28	Country around Mt. Hecla in Iceland.	.....	.....	Hecla had been in eruption for some time before.	v. Hoff.
—	Throughout Italy	Many violent shocks.	.....	.....	Ant. Campo, Hist. di Cremona, p. 84.
1301. June 11. At dawn, about noon, after vesper, and about midnight.	Place not mentioned. Somewhere in Italy.	Four shocks, at the hours mentioned.	.....	.....	Fragmenta Hist. Forojulienae, Muratori, t. xxiv. p. 1208.

1302	at Venice. At Riette (Rieti?) in Italy.				The walls of Hama and Alexandria were partly thrown down. Some other chroniclers give the dates 1302 and 1304.	p. 582. Collection Académique.
1303. Aug. 8. In themorning.	Alexandria and Acre, throughout the Peloponnesus, Candia, and all the Adriatic Sea. Felt but little at Venice.					HadschiChalifa; Abulfeda, v. p. 191; Vite de' Duchi di Venezia, loc. cit. p. 772.
—	In Poland					Gentleman's Magazine, vol. lvii. p. 175; Gazette de France, 14 Avril, 1786.
1304. Oct. 23	In Italy. Exact place not mentioned. Probably felt at Ferrara and Placenza.					Chron. Estense, Muratori, t. xv. p. 351; Chron. Placent., Mu- ratori, t. xvi. p. 485.
1306? Some time after the earthquake in Candia.	Rimini				Many houses thrown down	Ricobaldi Ferrar Chron., Muratori, t. ix. p. 254.
1307. In the 8th month.	Japan	Very violent				Kämpfer (v. Dohm), p. 229.
1311	Laybach in Carinthia					Vassali—Eandi sur les tremblemens de terre du 2 Avril 1808, p. 132.
1316. Sept.	At St. Denis in France					D'Acheri, Spicilegium, t. xi. p. 667.
1317. Dec.	In Italy	Two shocks in twenty-four hours. Lasted a long time				Martène et Durand, t. v. p. 561.
1318. Sept.	At Cologne					Acta Trevir. Archiepisc.; Martène et Durand, t. v. p. 407.
Nov. 14.	In England					Thom. Walsingham, Hist. Angl.; Camden, Angl. Norm., p. 111; Collection Académique.
1319	In the provinces of Ararat and Sini in Armenia.	Very violent			The capital Ani or Ana was completely ruined, and many other towns and villages were reduced to the same condition.	Dubois de Montpéroux, Voyages autour du Caucase, t. v. p. 287; Chakhathouno, t. ii. p. 19.
Oct. 1320. Dec. and	Sienna in Italy	Shocks during several days and nights.				Chron. Sanese, Muratori, t. xv. p. 62.
1321 May 25	Rome					Edinburgh Encyclopædia, article Chronology.
1322. June 1.	In Germany	Exceedingly violent.	Venice was inundated.			Baglivi, p. 542. Lycosthenes; Diarium Hist. p. 158.

L.	2.	3.	4.	5.	6.
1322. End of Nov.	At Geneva				Bertrand; Collection Académique.
1325. May 21. After 3 o'clock.	At Pisa	Several very violent shocks.			Chron. di Pisa, Muratori, t. xv. p. 998; and t. xxvi. p. 648.
1326. In summer.	Florence	Very violent, but lasting a very short time.		Followed by a luminous meteor the night after.	G. Villani Chron. lib. ix. c. 297, Muratori, t. xiii. p. 571.
1328. Aug. 4. 1st hour of the day.	Bohemia, Thuringia, Mynsia (Meissen?), and other parts of Germany.				Chron. Aulæ Regiæ, Rerum Bohe- micæ, Fréher, p. 55.
— Sept....	At Brünn			During a period of very rainy weather, which had been preceded by extreme heat and drought.	Ditto, p. 62.
— Dec. 1. 1 A.M.	Italy, especially at Perugia and the neighbourhood.			In the following month (October) violent storms were experienced in France.	D'Acheri, <i>loc. cit.</i> p. 733.
1329. May 22. In the evening.	Rome, Norcia, &c., in the states of the church. Most violent at Norcia.	The shocks continued at intervals for some months afterwards.		Norcia was completely ruined: 5000 persons perished.	G. Tarcagnola, fol. 182; G. Villani; Collection Académique, &c.
1331. March 13.	At Prague. Also felt in the remainder of Bohemia and in Bavaria.				Chron. Aul. Reg., Rerum Bohe- micæ, Fréher, p. 66.
	Cesena in Italy	Eighteen shocks during the day and following night. They did not entirely cease for a month.	The sea was agitated.		Annales Cæsenates, Muratori, t. xiv. p. 1152.
1332. Feb. 12. In the evening.	Thuringia and at Meissen. Also at Constantinople.			Accompanied at Constantinople by violent atmospheric perturbations.	Eberus; Niceph. Gregoras, Hist. Byzantine, p. 283 and 772.
1334. Feb. 23. In the morning.	Cesena in Italy				Annales Cæsenates, Muratori, t. xiv. p. 1157.
— Dec. 4	Verona				Chron. Veronense, Muratori, t. viii. p. 649.
1335. May 15	Mugello in Italy			In consequence of this earthquake, Monte Falterona near Decomanno separated, and an immense landslip took place, the body of earth moving more than four miles. The Arno and its affluents were troubled as far as	G. Villani, Muratori, t. xiii. p. 769.

1336. Sept. 5.	Bologna?				Chron. di Bologna, Muratori, t. xviii. p. 369.
1337. Jan. 15, and middle of the following night.	Cesena in Italy?	Violent shocks.			Annales Cæsenses, Muratori, t. xiv. p. 1175.
1338	In Japan	Very violent			Kämpfer v. Dohm, p. 230.
1339. June 21	In Iceland				Gaimard, Voyage en Islande, p. 313.
	Cremona	Very violent			Ant. Campo, Hist. di Cremona, p. 117.
	Arezzo in Italy				Annales Arretini, Muratori, t. xxiv. p. 879.
	Tripolis in Syria				Hadschi Chalifa.
	Southern part of Iceland			Followed the next year by a violent eruption of all the volcanoes of the south of Iceland.	Voyage en Islande, p. 313; v. Hoff.
1342. Towards the end of the year.	Province of Utrecht				Guill. Heda, Hist. Ultrajectina, p. 242.
1343. Jan. 25, 20th hour (Italian time).	Venice	Very violent shocks, which continued more or less for 15 days.		Many buildings were injured. The Diarium Historicum gives the date 1340.	Tarcagnota, fol. 191; Sansovino, Hist. di Vinegia, p. 569; Magnati, p. 121.
Nov. 25	Naples			During a tempest	Petrarch, Op. epist. lib. v. epist. 72 (editio princeps).
1344. Middle of the autumn.	Constantinople, Syria, and Egypt.	Many and violent shocks.	The sea inundated its shores at Constantinople.	Accompanied at Constantinople by atmospheric commotions.	Hadschi Chalifa; Niceph. Gregoras, Hist. Byzantinæ, p. 434.
	At Lisbon, and along the sea coast.	Many violent shocks.			Baronius, t. xiv. p. 961; Charenton, Histoire d'Espagne, t. iii. lib. xvi. p. 500.
	Southern part of Iceland; and the province of Guuldalen in Norway.			Fifty farms were destroyed at Ganlarass in Norway; and the river Guul disappeared underground, reappearing several days after, and carrying with it so much débris as to choke up the valley and produce an inundation. Arngim Jonsen reports this event in the year 1339.	Keilhau on Norwegian earthquakes in the 'Magazin for Naturvidenskaberne,' Christiania, 1835, vol. xii., 82nd and following pages.
1345. Jan. 31	Reggio in Italy	Very considerable			Chron. Regiense, Muratori, t. xviii. p. 60.
Feb. 1	Venice	The shocks lasted fifteen days.		Probably confounded with the earthquake of Lycosthenes; Frytschius. 25th Jan. 1343 at the same place.	
Sept. 12	Florence, and other places in Tuscany.				G. Villani, loc. cit. p. 930.

1.	2.	3.	4.	5.	6.
1345. Dec. 22. At night.	Florence, and other places in Tuscany. Western part of Iceland.				G. Villani, <i>loc. cit.</i> p. 930.
1346. Feb. 22. In the evening.	At Reggio?		A hitherto unseen rock was elevated in Breidaford.		v. Hoff.
Nov. Night between 24 and 25.	Switzerland, especially at Bâle.			Many buildings thrown down.	Chron. Regiense, Muratori, t. xviii. p. 62. Bertrand; Collection Académique.
1348. Jan. 25.	Constantinople Hungary, the Tyrol, Italy as far south as Rome and Naples, Bavaria, Carinthia, Switzerland, parts of Germany, and Poland. Especially violent at Rome, Venice, and Bâle.	Very violent. The shocks recurred at intervals for forty days.		Caused very great destruction of buildings. The earth opened in different places, and pesti- lential exhalations came forth. A <i>rain of blood</i> is mentioned as having fallen in several localities. Great damage was done to build- ings, &c. The date of the year seems very doubtful, as different authors vary from 1343 up to 1349, and indeed, it does not seem cer- tain that there was not more than one earth- quake of great extent about this time.	Poggendorff's Annalen, t. lviii. p. 652. Martène et Durand, t. v. p. 254; Baronius, t. xiv. p. 1048; Conrad v. Lichtenau, p. 193; Chron. Hir- saug; Lycosthenes; Frytschius, &c.
Feb. 6. Frankfort on the Maine Feb. 7. Modena?					Lerner's Chronik; Kriegk. p. 14. Annales veteres Mutinensium, Mu- ratori, t. xi. p. 82.
At night. 1349. Sept. 9. At the hour of mass.	Bologna, Orvieto, and as far as Pisa.			The rivers, &c. were troubled for more than twelve days.	Chron. d'Orvieto, Muratori, t. xv. p. 654; Chron. di Bologna, Mu- ratori, t. xviii. p. 414; Chron. Cassinense, &c.
— 10.	Rome, Naples, and all the south of Italy. Also felt throughout most of the other parts of Europe.	The shocks which commenced now lasted more than eight days.		Great damage done to buildings ...	Baglivi, p. 542; G. Villani, Mura- tori, t. xiv. p. 46.
1350	Rome. Also felt at Nardo.				Baglivi; Collection Académique; Chron. Neritinum, Muratori, t. xxiv. p. 905.
—	At Lisbon				Fr. Kries, von den Ursachen der Erdbeben, S. 16.
—	In Switzerland				Schmieder's Geognosie, p. 141.
1352. Dec. 25. In the evening.	Borgo-S-Sepolcro in Italy.	Continued until the 31st.		A mountain was cleft by this earthquake	Matthæo Villani, Muratori, t. xiv. p. 189.

1353. Jan. 1. At night.	Borgo-S-Sepolcro and Modena.	The shocks were very violent, and continued at intervals for more than a month.	2000 people lost their lives	Mathæo Villani, and Chron. Mutinense, Muratori, t. xv. p. 618.
— March 1.	In Romagna, extending all along the coast, and even to Constantinople.	Very violent shocks.		Mathæo Villani, Muratori, t. xiv. p. 227.
1354. In the beginning of spring.	All the coast of Thrace.		Great damage done to both life and buildings. Probably only the same event with the last.	Cantacuzene, Hist. 2. p. 861.
1355. Sept. About the 9th hour.	Bâle and Strasburg		Buildings thrown down. The two-vol. edition of the chronicle cited does not mention this event.	Chron. Hirsang. (one-vol. edition), p. 295.
—	Rome			Collection Académique; Baglivi, p. 542.
1356. Aug. 24	Lisbon	The shocks lasted a quarter of an hour, and continued at intervals for a year.	Many buildings thrown down	Tavares, über die mineralwasser Portugals; Mém. de Chronol. t. ii. p. 912.
— End of Sept. and beginning of Oct.	Spain, especially at Cordova, Seville, and Basala. Also slightly in Tuscany.			Mathæo Villani, Muratori, t. xiv. p. 404.
— Oct. 18. 10 P.M.	All the upper Rhine, especially at Strasburg and Bâle, district of Constance, Lausanne, Berne, and the borders of Bavaria. Guillaume de Nangis says that Rheims and Paris also experienced it.	The shocks recurred at Bâle during the whole of the year.	Thirty-eight chateaux were destroyed in the bishopric of Constance. At Bâle, after the shocks, the town took fire, and the flames were not extinguished for some days.	Bertrand; Lycosthenes; Frytschius; Chron. Hirsang.; Guillaume de Nangis, &c.
1357. May 14. About 7 or 8 A.M.	Bâle, Strasburg, and all through Alsace, Neuchâtel and Soleure in Switzerland. Also in Swabia, and in Spain at Seville and Cordova.	Very violent shocks.		Chron. Hirsang.; Martène et Durand; Lycosthenes; Frytschius; Bertrand, &c.
1358	Laybach in Carniola Poland		Followed by an abundant harvest	Collection Académique. Gentleman's Magazine, vol. lvii. p. 175; Gazette de France, 14 Avril, 1786.

1.	2.	3.	4.	5.	6.
1361. July 17. Hour of vespers. — Dec. 27. In the morn- ing.	District of La Puglia in Italy.	Violent shocks		At Ascoli 4000 persons perished	Mathæo Villani, Muratori, t. xiv. p. 664.
	At Sienna	Seven terrible shocks, and in the next twenty-four hours seventeen or eight- teen, great and slight. The shocks did not entirely cease for four days.		Great destruction of buildings. The inhabitants encamped under tents. Followed by diseases.	Chron. Sanese, Muratori, t. xv. p. 169.
1363. (On a Thursday.) Midnight.	Modena?	Three shocks		Accompanied by noise	Annales veteres Mutinensium, Mu- ratori, t. xi. p. 83.
1364. Feb. 1	Bologna?	Two violent shocks			Chron. di Bologna, Muratori, t. xviii. p. 473.
1365. Mar. 4. At night.	Venice, Padua, Treviso, Ferrara, and the coun- try round	Great shocks for an hour.		The Chron. Estense says the 6th March, and only mentions Ferrara as affected.	Ditto, p. 477.
— July 25	Bologna	Violent shocks		Accompanied by thunder, and followed, the next day, by a violent storm.	Ditto, p. 478.
1367. Sept. 21. At the rising of the sun.	Verona	A violent shock, fol- lowed after an in- terval of half an hour by a second.			Chron. Veron., Muratori, t. viii. p. 658.
1368. In Whit- sun-week. (Whit-Sunday being on the 21st May.)	In Thuringia, at Mühl- hausen, Eisenach, and other places.				Rivander's Düringische Chronica, p. 426.
1370	Province of Alves in Ice- land.				Voyage en Islande, p. 313; v. Hoff.
1372. June 1	At Bâle	Some slight tremulous motion, not felt ex- cept in the imme- diate environs.		The Collection Académique mentions a second earthquake at the same place on the 1st July of the same year, but it is probably only a mistaken date for the single event here mentioned. Five days after the earthquake a ring round the sun and two crosses were	Collection Académique; Lycosthenes.

1373.	Jan.	in Arragon, Spain. Vicenza in Italy	Two very violent earthquakes on the same day. A great earthquake...	Accompanied by noise	Annales Vicentini, Muratori, t. xiii. p. 1240.
—	Mar. 1.	Venice	One shock .....	...	Marino Sanuto, Vite de' Duchi di Venezia, Muratori, t. xxii. p. 673.
—	11.	Arragon in Spain	A second shock .....	...	Chron. Vliacense, Marca Hispanica, p. 759.
—	Middle of the night.	Ditto .....	...	...	Ditto.
—	19.	...	...	...	...
—	After the setting of the sun.	...	...	...	...
—	April.	Vicenza in Italy .....	...	Accompanied by noise	Annales Vicentini, Muratori, t. xiii. p. 1240.
—	At night.	...	...	...	Marino Sanuto, <i>loc. cit.</i>
—	May 19	Venice	Another great earthquake.	...	...
—	June 5	Ditto	Ditto .....	...	Ditto.
1374	.....	Montpellier in France...	Four earthquakes during the year.	...	Petit Thalamus de Montpellier, MS. communication from M. de Christol to M. Perrey.
1376.	March	Vicenza in Italy	Preceded by three others betw ⁿ the 25th Dec. and this date.	Accompanied by noise. Every one considered this earthquake as not less violent than that of the 25th January 1348.	Annales Vicentini, Muratori, t. xiii. p. 1244.
12.	In the morning.	...	Very violent.....	The morning bright and clear. Much hail and snow during the day and evening. The earthquake accompanied by noise.	Ditto.
—	19.	Ditto .....	...	Attended with noise	Ditto.
—	At night.	...	...	...	...
—	April.	Ditto	Four more shocks .....	...	...
—	Night between 10 and 11.	...	...	...	...
1378.	10 and Jan....	In the north of Spain...	...	Masses of rock were detached from the Pyrenees and fell into the valleys below.	Palassou quotes Abrégé nouveau de l'Histoire d'Espagne, t. xi. p. 122. (Edit. in 12mo.)
—	June 1	In Switzerland	A considerable earthquake.	Bertrand and the Collection Académique give the date 1st July 1380, but it is probably the same with that mentioned here.	Lycosthenes; Bertrand; Collection Académique.
—	April 20	Various parts of France and Switzerland. Also in Italy.	...	...	Bertrand, p. 38; Massena.
1382.	.....	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
1382. May 21 and 24.	In Britain. Also in France, Brabant, Flanders, and the country round.	.....	Some days after, vessels were violently dashed against one another by the agitation of the waves.	Most violent in England. The Collection Académique says that there were reiterated shocks this year in Switzerland and Italy, and great disease in the former country, as also in Germany, there being a complete absence of winds there. Lycosthenes gives the date 1381.	Martène et Durand, t. v. p. 321; Baronius, t. xv. p. 88; Collection Académique, &c.
1383. Aug. Hour of none.	At Mytilene.....	Extremely violent shocks.	.....	The buildings were rocked from side to side like trees in a tempest. After midnight all were in ruins. 500 persons perished.	Muratori, t. xviii. p. 90.
1385. July 16 At night.	In England	Followed by another earthquake the same year, the exact date of which is not given.	.....	.....	Thom. Walsingham, Hist. Angl., Camden, Angl. Norm. p. 315 and 326; Collection Académique.
— Sept. 19. Middle of the day.	Vicenza .....	.....	.....	Accompanied by noise	Annales Vicentini, loc. cit. p. 1262.
1389. Feb. 10. Immediately before sunrise.	Ferrara?	Lasted twenty minutes.	.....	.....	Chron. Estense, Muratori, t. xv. p. 503.
— Oct....	In Tuscany, especially at Castello, Mercatello, and Borgo-S-Sepolcro. <i>Feebly</i> felt throughout almost all Italy.	.....	.....	Many buildings thrown down	Annales Forolivienses, Muratori, t. xxii. p. 196.
1391. March 22.	In Switzerland .....	.....	.....	A comet appeared to the people of Germany, followed by great rains, inundations, famine, and pestilence.	Lycosthenes; Collection Académique.
—	Throughout almost the whole of Iceland.	.....	.....	.....	Voyage en Islande, p. 313; v. Hoff.
1392. Jan. 27	All the Neapolitan coast.	No land shock mentioned.	The sea retired more than 40 paces, leaving the shore dry.	.....	Annales Bonincontri, Muratori, t. xxi. p. 60.
1393. May 30 to June 15.	Galiata in Italy	Numerous shocks .....	.....	Caused great damage	Chron. di Piero Minerbetti, Muratori, t. xxvii. p. 317.
— July 5	Bologna	Violent shocks .....	.....	“On the 11th little children had the small-pox, and on the 18th there was a terrible tempest.”	Chron. di Bologna, Muratori, t. xviii. p. 356.
1394. Mar. 22	Switzerland, France, and Germany.	Exceedingly violent .....	.....	The mountains were shaken to their summits. Followed by excessive heat, and an abundant and early harvest.	Bertrand; Scheuchzer; Mém. de Chronol. t. ii. p. 913.

1395. Dec. 18. Province of Valencia and at Tortosa in Spain.	.....	.....	Many buildings, &c. ruined. At Alcira two fountains gave forth water of an abominable smell, and the colour of ashes.	.....	Baronius, t. xv. p. 167.
— Middle of December.	.....	.....	.....	.....	Chron. Neritinum, Muratori, t. xxiv. p. 908.
— Nardo, and all through the province of Otranto.	.....	.....	.....	.....	Communication of M. Quetelet to M. Perrey.
— At Antwerp.	.....	.....	So violent that dishes, &c. would not remain at rest on the tables.	.....	Physicalische Betrachtungen über das Erdbeben, u. s. w. Vorrede.
— In Germany	.....	.....	.....	.....	Petit Thalamus de Montpeller, MS. Communication of M. de Christol to M. Perrey.
1397. ....	.....	.....	Accompanied by an epidemic	.....	Annales veteres Mutinensium, Muratori, t. xi. p. 83.
1399. July 20. Modena?	.....	Two violent shocks	.....	.....	Annales Estenses, Muratori, t. xviii. p. 958.
5th and 6th hours.	.....	.....	.....	.....	.....
— 21. Ferrara.	.....	.....	A pestilence in the country, the same year	.....	.....
6th hour of the night.	.....	.....	.....	.....	.....
1402. ....	.....	.....	Thesea retired, so that the bottom could be seen at more than a mile from the ordinary beach, and then returned with great impetuosity.	.....	Muratori, t. xviii. p. 974.
1403. Mar. 17 Rome	.....	.....	.....	.....	.....
— Japan	.....	.....	.....	.....	Baglivi, p. 542; Collection Académique.
1405. ....	.....	.....	.....	.....	Kämpfer v. Dohm, t. i. p. 232.
1406. Sept. 16. Naples	.....	.....	Accompanied by an eruption of a volcano in the province of Simotaky in Japan.	.....	Ditto.
1407. hour of the night.	.....	.....	.....	.....	Giornali Napolitani, Muratori, t. xxi. p. 1070.
1408. Jan. 3. Ferrara?	.....	.....	.....	.....	Annales Estenses, Muratori, t. xviii. p. 1045.
At dawn.	.....	.....	.....	.....	Kämpfer v. Dohm, t. i. p. 232.
1409. Aug. 16. Ferrara. Not felt elsewhere.	.....	.....	.....	.....	Diario Ferrar., Muratori, t. xxiv. p. 174.
1409. night.	.....	.....	.....	.....	.....
At night.	.....	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
1410. Aug. Night between 9 & 10.	Venice	A slight shock.....	.....	Followed, on the evening of the 10th, by a terrible tempest, which did great damage.	Vite de' Duchi di Venezia, <i>loc. cit.</i> p. 853.
1413. Aug. 8	Sienna	The shocks continued night and day (for how long?). Very violent shocks.	.....	Many houses, &c. were thrown down	Archivio dello Spedale.
1414. Aug. 3. 22nd hour.	Pisa, Lucca, Florence, and Borgo-S-Sepolcro.	Two very violent shocks.	.....	At Borgo-S-Sepolcro houses were thrown down, and 200 persons perished.	Archivio storico Italiano, t. vi.
Hour of nones and vespers.	7. Florence .....	.....	.....	Overthrew 200 chimneys, and cracked some of the walls.	Istorie di Firenze, Muratori, t. xix. p. 956.
1415. June 21	Bâle.....	.....	.....	The inhabitants took flight	Bertrand and Coll. Académique.
1416. July 22	Ditto .....	.....	.....	Possibly only the same with the last	Bertrand; Collection Académique; Lycosthenes; Scheuchzer.
1418. A little before Apr. 7.	Throughout Dalmatia...	Shocks on several days and nights. Very violent.	.....	Many houses ruined, and the walls of a castle overthrown.	Muratori, t. xxii. p. 920.
1419. (Sept.?)	Above Trente, towards Morano in Italy.	.....	.....	The earthquake caused an inundation between two mountains. 600 cabins were ruined, and 800 persons perished. (By the earthquake or the inundation?)	Vite de' Duchi di Venezia, <i>loc. cit.</i> p. 930.
1420	Sienna	Very great. It lasted the time one would take to make twenty steps.	.....	.....	Annali Sanesi, Muratori, t. xix. p. 428.
.....	Province of Catalonia in Spain.	The earth trembled every day (for how long?).	.....	The town of Amer was overthrown	Palassou, Suite des Mém. pour servir à l'Histoire nat. des Pyrénées, p. 379.
1421. Sept. 18	Negropont	Violent shocks lasting for four days.	.....	The people lived in tents during this earthquake.	Muratori, t. xxii. p. 940.
1425. Aug. 10. 1 P.M.	Ferrara.....	One great shock at the time mentioned, and two others an hour and a half after.	.....	Chimneys were thrown down by the last two shocks.	Diario Ferrar., Muratori, t. xxiv. p. 185.
.....	About the whole	The shocks lasted for two hours.	.....	Preceded by a dreadful tempest	Stow's Annals, p. 368; Collection Académique; Mém. de Chronol. &c.
.....	.....	.....	.....	.....	Edinburgh Encyclopædia, Article Chronology.

(May 1429. according to ancient Latin manuscript.)	Numerous shocks	Twenty towns were much injured. In this year one of the well-known risings of the island of Santorin in the Archipelago took place.	Many towns ruined.....	The Catalan manuscript cited above, as quoted by M. Fournet in the memoir of M. Perrey on the earthquakes of the basin of the Rhone, Notes additionnelles.
Feb. 2 Ditto				Annales Forolivienses, Muratori, t. xxii. p. 215.
July 4	In Romagna		Chimneys thrown down in many places	Lycosthenes; Bertrand; Collection Académique; Scheuchzer.
Dec. 13. In the evening.	Bâle, and the country round.		Tiles were thrown from the roofs, chimneys overthrown, and walls cracked. Great damage was done throughout the canton.	Chron. Foroliv., Muratori, t. xix. p. 902.
1429. Sept. 16. 18th hour.	Forli in Italy	Lasted but a short time.		Tizio, Hist. Senens. t. i. p. 212.
1430. Aug. 12. 6th hour of the night.	Sienna	A great and sudden earthquake.		Charenton, Histoire d'Espagne, t. iv. liv. 21. p. 263; Palassou, p 261.
1431. April 24. 2 P.M.	Catalonia, Arragon, and at Roussillon. Also at Ciudad Real.	Exceedingly violent.	Some fortifications were thrown down	Ditto.
Some time after the 24th.	Grenada			Collection Académique.
May 1433.	Laybach in Carniola		Followed by great fertility	Sigonius, de episc. Bononien. lib. iv. p. 470.
	Bologna	Very violent shocks.		Annales Silesiæ, Cur. Freistadienai, p. 312.
	Throughout Silesia			J. Bandini, Hist. Senen., Muratori, t. xx. p. 48.
March 1436. Towards the end of the month.	Sienna	Very violent	The bells were made to sound, and houses were overthrown.	Annales Placentini, Muratori, t. xx. p. 875.
June 10. 1438. hour of last night.	Placenza, Parma, and the neighbourhood.		Houses thrown down	Annales Silesiæ, p. 137; Martini Cromeri, de Reb. Polon. p. 328; Bonfinius, Rerum Hungar. dec. 3. lib. vi. pp. 456, 465, &c.
the June 5 1443.	Bohemia, Silesia, Poland, and especially Hungary.		Many buildings ruined	

1.	2.	3.	4.	5.	6.
1444. Nov. 30. Before sunrise.	Bâle and its environs ...	A slight earthquake...		In the beginning of this year there were eruptions of Etna, and volcano in the Lipari islands, each accompanied by earthquake shocks.	Bertrand; Scheuchzer; Collection Académique.
1448. Nov. 4	Rome .....	.....	.....	All the houses were much shaken.....	[part 2. p. 1132.
.....	Naples .....	.....	.....	Some thousand people perished.....	Vitæ Rom. Pontif., Muratori, t. iii.
1448 or 1449	Ravenna .....	.....	.....	Preceded by continuous rain	Lycosthenes; Frytschius.
1449. Apr. 23	"In Flanders and some other places."	.....	.....	.....	Collection Académique; Bertholon,
.....	Laybach in Carinthia .....	.....	.....	.....	Électr. des Météores, t. i. p. 370.
1450	In the kingdom of Naples.	Extremely violent .....	.....	.....	Platina and Massæus.
.....	.....	.....	.....	Followed by a frightful pestilence.....	Collection Académique.
1453. Sept. 28.	Florence	According to Martène	.....	Naples, Ariano, Cara, and other towns suffered greatly.	Frytschius; Casp. Goldwurm, Beschreibung göttlicher und teuflischer Wunderzeichen, Frankfurt, 1567; Sebast. Franckens, Chronicon Germaniæ.
4th-5th hour of the night.	.....	.....	.....	Many walls cracked, and chimneys thrown down.	Chron. di Bologna, Muratori, t. xviii. p. 703; Martène et Durand, t. v. p. 482.
1454. Dec. 4	In La Puglia, the Calabria, and Naples.	Shocks during three days.	.....	.....	Mémorial de Chronologie, t. ii. p. 913.
1455. Dec. 20. 4½th, 5½th, and 19th hours of the night.	Bologna	Three shocks at the hours mentioned.	.....	The first shock threw down some chimneys, &c., and was accompanied by noise. Sigonius gives the date Dec. 21.	Chron. di Bologna, loc. cit. p. 719; Annal. Bonon., Muratori, t. xxiii. p. 888.
1456. Aug. 22	Sienna .....	.....	.....	.....	Sarti, Saggio di congettura su i terremoti, loc. cit.
.....	Liège .....	.....	.....	.....	Martène et Durand, t. v. p. 491.
2 A.M. Dec. 5.	Throughout the kingdom of Naples. Also felt at Rome, and probably further north. Lanesanne and all the Canton du Vaud were vio-	Very violent and destructive shocks.	A great many towns very much injured. 60,000 persons perished. Sarti reports it as having been felt at Sienna on the 9th, but it is probably only the same earthquake.	Baronius, t. xvii. p. 176; Giannone, Hist. di Napoli, t. iii. p. 7; Martène et Durand, t. v. p. 494; Collection Académique, &c.

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1.	2.	3.	4.	5.	6.
1465. 13.) (May)	Gubbio?	Two great earthquakes, followed by a third still greater during the night.	Chron. Eugubinum, Muratori, t. xxi. p. 1009.
1466. Jan. 14. 9th hour.	Naples and the country round, especially at Boscino, Piescopagano, &c.	Lastest the time of a <i>miserere</i> , decreasing however in violence towards the end.	.....	.....	Istoria Napolitana, Muratori, t. xxiii. p. 234.
— In summer.	Soissons and the neighbourhood.	Great earthquakes .....	.....	Many buildings thrown down. Accompanied by a pestilence and great storms.	• Mézerai, t. ii. p. 126 (3 vol. edit.).
— Oct. Night between 27 and 28.	Gubbio.....	.....	.....	.....	Chron. Eugub., Muratori, t. xxi. p. 1013.
— Dec. 26. 15th hour.	Ditto .....	.....	.....	.....	Ditto.
—	Japan	Many earthquakes in the same year.	.....	.....	Kämpfer, v. Dohm, p. 233.
1467. Aug. End of the month.	Sienna	Very violent shocks, lasting for twenty days.	.....	.....	Hist. Senen., Muratori, t. xi. p. 63.
1468. Feb....	Vienna.....	A disastrous earthquake.	.....	.....	Chronicon Haselbergii Viennense.
1470. Feb. 6. 5 P.M.	Bâle.....	One shock .....	.....	Accompanied by great cold and a heavy fall of snow. Mérian gives the date 21st Feb.	Collection Académique.
1471. March	Gubbio?	Great and numerous shocks.	.....	.....	Chron. Eugub., Muratori, t. xxi. p. 1020.
— Aug. 15. 22nd hour.	Brescia .....	.....	.....	The author who reports this event, says that there fell this year in Italy hailstones larger than ostrich eggs.	Philippi Bergomat. suppl. chron. fol. 388.
1473. May 7. 13th hour.	Milan, Pavia, and Placenza.	.....	.....	Rain continuous for almost the whole month	Annales Placentini, Muratori, t. xxi. p. 942.
1474. Dec. 17. 17th hour.	Sienna	Five great shocks .....	.....	.....	Allegretti, <i>loc. cit.</i> p. 781.
— 18. 12 in the morning.	Ditto	One shock .....	.....	.....	Ditto.
1475. Aug. 24.	Frankfort on the Maine.....	.....	.....	.....	Lerner's Chronik; Kriegk. <i>loc. cit.</i>

1481. Feb. 7. 5th hour of the night.	Parma	Three shocks .....	.....	.....	Diarium Parmense, Muratori, t. xxii. p. 364.
— — — — — About the middle of May.	Pisa and Lucca	Very great shocks .....	.....	.....	Matthiæ Palmerii, <i>loc. cit.</i> p. 269.
— — — — — After Aug. 19.	Territory of Fivizzano in Tuscany, and the neighbourhood. Island of Rhodes	Sixteen shocks .....	.....	Seventeen houses entirely overthrown, and several others injured.	Diarium Parmense, <i>loc. cit.</i> p. 373.
.....	Ragusa.....	.....	.....	.....	Collection Académique.
1482	Ditto .....	.....	.....	.....	Paul Partsch, Bericht über das Detonations-Phänomen auf der Insel Meleda bei Ragusa, Wien, 1826, 8. p. 188.
1483. Mar. 11.	Ferrara.....	A very great earthquake. The bell of Rige bello sounded five strokes.	.....	.....	Ditto.
1484. Jan. 20. About mid- night.	Rome. Also felt at Lamentana, Castel-Nuovo, &c. in the neighbourhood.	Lasted an <i>Ave Maria</i>.	.....	.....	Diario Ferrar., Muratori, t. xxiv. p. 266.
1486. Sept. 30.	Sienna	Two shocks, followed a little after by a third much more violent.	.....	.....	Vitæ Roman. Pontif., Muratori, t. iii. part ii. p. 1083.
— — — — —	Naples .....	.....	.....	.....	Allegretti, <i>loc. cit.</i> p. 821.
1487. Dec....	Padua	Very violent .....	.....	.....	Vivenzio, Istoria de' tremuoti, &c. p. 11.
1489	S-Sepolcro	One shock .....	.....	.....	Tarcagnota, <i>loc. cit.</i> fol. 315.
— — — — —	Constantinople .....	.....	.....	.....	Sarti, Saggio di congetture, &c. Edinburgh Encyclopædia, Article Chronology.
1490	In Italy, extending even to Constantinople.	.....	.....	.....	Huot, Géol., t. i. p. 110.
— — — — —	The whole of the island of Candia.	.....	.....	.....	Olivier, Voyage dans l'Empire Ottoman, t. ii. p. 298.
End of	In the Archipelago, especially in the island of Cos.	Very violent shocks	.....	In Cos, 5000 people perished under the ruins. The Collection Académique gives the date 1493.	Tarcagnota, Hist. del Mondo, t. iv. fol. 318.
1491. Oct. Nov. 7.	Bâle.....	Very violent .....	.....	.....	Bertrand; Collection Académique.
1492.	.....	.....	.....	.....	.....

	2.	3.	4.	5.	6.
Aug. 18. Sienna				Followed by a high wind, which increased during the night.	Allegretti, <i>loc. cit.</i> p. 929.
Aug. 19. Pisa		During the course of the month, many shocks both by day and night, of which some were very violent.			Pertuscelli, <i>Memoriale, nell' archivio storico Italiano</i> , t. vii. part 2. p. 293.
Dec. 13. Ferrara		Lasted the time of saying a <i>pater</i> and an <i>ave Maria</i> .		Threw down thirty chimneys. It had been raining or snowing since the 1st, and the Po was much swollen.	D'Asio Ferrar. <i>loc. cit.</i> p. 316.
Jan. 30. Bologna					G. Agricola, <i>Mineralog. Schriften</i> Tenth. übersezt von Lebrmann, Freiberg, 1807, B. II. p. 209.
" In the East "					<i>Mémorial de Chronologie</i> , t. II. p. 913.
Jan. 4. Japan		Two very great shocks.			Kämpfer, v. Dohn, p. 234.
Jan. 4. Sienna					Allegretti, <i>loc. cit.</i> p. 887.
Oct. 10. Bale					Mérian, über die in Basel wahrgenommenen Erdbeben.
May. Different parts of Switzerland.					Bertrand; <i>Collection Académique</i> .
June 5. Modena		Considerable shocks		Some chimneys were thrown down, and almost all the houses injured.	Annal. vet. Musæum, Münster, t. XL p. 86; D'Asio Ferrar., <i>Münster</i> , t. xxiv. p. 396.
Aug. 14th		Another shock.		Threw down the church of St. Blasie.	Ditto.
— 9. Ditto					G. Dogliosi, <i>Thes. Univ.</i> t. II. p. 462.
Island of Candia					<i>Mémorial de Chronologie</i> , t. II. p. 913.
Venice		Shocks, lasting for several hours.			
April 5. In Andalusia, especially at Carmona, Seville, and Torina on the Guadalquivir.		Exceedingly violent.		Buildings were thrown down	Ferreras, <i>Histoire d'Espagne</i> , t. VIII. p. 202; Turquet, <i>Histoire d'Espagne</i> , p. 1334.
Aug. 27. Geneva		A violent earthquake			Bertrand; <i>Collection Académique</i> .
Aug. 10. Ditto		Violent shocks.			Ditto.
Aug. 23. In Belgium		Lasted but a short time.			Johannes de Los Champs, p. 119; Bulletin de l'Acad. de Bruxelles, t. IX. part 1. p. 559.

autumn. 1505. June 30. 4 A.M.	In Belgium	Lasted but a single instant.	.....	.....	Johannes de Los Chron. p. 120.
About the middle of the year.	The high land of Cabul in Afghanistan.	Extremely violent. On one day thirty- three shocks were counted, and each day and night for four weeks there were two or three.	.....	The earth opened in many places, and closed again, often throwing forth water, which took the place of the dry land. For a space of six to seven German miles the surface of the earth was so altered and disturbed that parts were some- times raised as high as an elephant above their former level, and then sunk as deeply below it.	Berghaus' Annalen der Erdkunde, 3 ^{te} Reihe. Bd. 1. p. 312, quoting Sultan Baber's Memoiren.
Dec. 30. 9th hour of the night.	Bologna .....	.....	.....	.....	Sigonius, p. 521.
1506. Jan. 1. 11th hour of the night.	Ditto	More violent than the last.	.....	Accompanied by subterranean bellowing noises	Ditto.
1507	Constantinople .....	.....	.....	.....	Huot, Géol. t. i. p. 110.
.....	Island of Santorin .....	.....	.....	A part of the island sank into the sea	Dapper, Beschryving der Eilanden in de Archipel. p. 183.
.....	Laybach in Carinthia .....	.....	.....	.....	Vassali—Eandi, loc. cit.
1508. May 29.	In the Archipelago; espe- cially in Candia, Paros, Naxos, and Chios.	Many shocks .....	.....	.....	Tarcagnota, t. iv. fol. 365; Mura- tori, t. xxiv. p. 595; Martin Baumgarten, lib. iii. c. 26.
.....	Constantinople	Shocks for forty days.	.....	Probably at the same time with the last men- tioned.	Mém. de Chronol. loc. cit.
.....	In Italy and Germany ...	Several earthquakes	.....	Accompanied by atmospheric perturbations	J. Nacleri Chron. t. ii. p. 547; Stumpffius.
1509 Sept. 14.	Constantinople, and all the rest of the Turkish dominions, both in Europe and Asia Mi- nor.	The shocks were the most violent ever known here, and lasted, according to some, 18 days, and to others 25.	The sea came over the walls at Constanti- nople and Galata.	1700 houses and large portions of the walls were thrown down, and some thousand people lost their lives. Tschorum, Gallipoli, Demi- toka, and other towns were ruined. v. Hoff gives the date 1510.	Hadschi Chalifa; v. Hammer, Ge- schichte des Osmanischen Reiches, vol. ii. p. 349; Lycosthenes; Naclerus, &c.
Nov. 1 The 1st and 2nd at night; the 2nd towards evening.	Freiburg in the Brisgau	Two shocks	The second was rather a noise and disengage- ment of gas than an earthquake. The first lifted the roofs into the air, and let them fall again, alternately.	Frytschius, Meteor. method. dialec- tica, fol. 142, verso.
16.	Adrianople	Hadschi Chalifa; v. Hammer, loc. cit.

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1509. Dec. 13.	Manosque (Basses-Alpes).				Statistique des Bouches du Rhône, Communication from M. Aug. Bravais to M. Perrey.
1510. June 10.	Nordlingen in Bavaria.			2000 individuals perished	Huot, Cours de Géologie, t. i. p. 110.
—	During the winter.	Several earthquakes.		Accompanied by very high winds, and intense cold.	Mézerai, t. ii. p. 335 (4to edit.); Lycosthenes; Collection Académique.
1511. Mar. 26.	Venice. Also felt at Padua, Trevisa, &c.	Rather considerable, but lasting a very short time.	The water in the canals was much agitated.	Some houses and statues were thrown down	Tarcagnota, <i>loc. cit.</i> fol. 373.
—	Laybach in Carinthia			Followed by a dreadful pestilence	Collection Académique.
—	Japan				Kämpfer, v. Dohm, p. 234.
1512	Valley of Palenza in Switzerland.	No shock felt		Two mountains separated, but whether this was caused by an earthquake or not, is not certain.	Bertrand; Collection Académique.
1513. Aug. 17.	Meissen in Saxony	Several shocks			Rivander's Düringische Chronik.
—	A mountain at the foot of the Alps, above Bellizone.			The mountain, shaken by an earthquake, fell with a great noise into the valley below, thereby diverting the course of the river Brennio.	Paul Joves, trad. de D. Sauvage, t. i. pp. 218 and 345.
1514. Jan. 20.	Bâle				Merian, über die in Basel wahrgenommenen Erdbeben.
—	Zante	A violent shock			Montgomery Martin, History of the British Colonies, vol. v. p. 431.
1517. June 26.	Nordlingen in Bavaria, and the country for two miles round.			During a violent storm. Produced great ruins.	Lycosthenes; Fincelinus, lib. iii.; Münsteri Cosmograph. Univ. lib. iii.
1519	The lower valley of Djandul, one of the valleys of Cabul in Afghanistan.	A violent earthquake.			Berghaus's Annalen der Erdkunde, quoting Sultan Baber's Memoiren.
1520	Ragusa				Partsch, Detonations-Phänomen zu Meleda, p. 188.
1521	Milan				Frundspersgerische Geschichtschreiber, lib. ii.; Puncius.
—	Milan				Huot, Cours de Géologie, t. i. p. 110; v. Hoff.
1522	Bâle				Merian, über die, &c. <i>loc. cit.</i>
—	Angers			During an eclipse of the moon. There were two lunar eclipses this year, namely on the 12th March and 5th September.	Philippi Bergomat. Suppl. Chron. fol. 437.

Dec. 27.	at Yverdun in the Pays de Vaud.	Three shocks		Berghaus in his preface to v. Hoff, quoting Mer- rian, gives the date 28th Dec.	Ditto. v. Hoff.
.....	Different points in the kingdom of Naples.	Many shocks			
.....	Grenada in Spain	Ditto			Ditto.
1524. April 22.	Bâle	.....		The French authors use the expression "un trem- blement de terre <i>avait pensé</i> renverser la ville."	Merian, <i>loc. cit.</i>
Sept.	Angers	Several shocks			Chron. Nic. Gellen; Mézerai; Philippi Bergomat.
1528	Mayence	Ditto			Fr. Nauseæ, Blancampiani, de præ- cipuo hujus anni 1528 apud Mo- guntiam terræ motu Responsum, 4to, p. 25.
1529. Sept. 11.	Bâle	.....			Merian, <i>loc. cit.</i>
1530. Sept. 1.	Coast of Paria and Cu- mana, near the island of Cubagua, South America.	.....	The sea rose four fathoms and sank again.	The earth opened in several places, and black foetid salt water and asphalt came out. A mountain at the side of the gulf of Cariaco re- mained cleft. A fort and many houses were destroyed.	Humboldt, Voyage aux régions équi- noxiales, t. ii. p. 272; Hist. des anciennes Rév. du Globe, p. 267.
About Flanders, Holland, and Zealand.		.....	During an inundation	Accompanied by heavy rain, thunder, and light- ning.	Tarcagnota, Hist. del Mondo, t. v. fol. 69.
1531. Jan. 26.	Lisbon, the remainder of Portugal, Spain, the opposite coast of Africa, the Canton du Vaud in Switzerland, and Flanders.	At Lisbon there were extremely violent shocks seven or eight times a day for eight days.	The sea was greatly agitated, and swal- lowed up several vessels. The waters of the Tagus were driven upon the banks by the rush- ing in of the waves.	In Lisbon 1500 houses and all the churches were thrown down. v. Hoff does not seem to think that the shocks in Flanders occurred at the same time with the rest. Tavares gives the date Jan. 1. The Coll. Acad. says that earth- quakes were very general the whole of this year and the next.	Turquet, Hist. d'Espagne, p. 1482; Collection Académique; Lyco- sthenes; Palmer; Naucier.; Gold- wurm, &c.
Begin- ning of the year 1532	Bâle	.....		Some houses were thrown down	Bertrand; Collection Académique.
.....	Lisbon	Another violent earth- quake.			Lycosthenes.
March 7.	Bâle	Very violent			Bertrand; Collection Académique.
1533. Nov. 25	Throughout Switzerland, principally at St. Gall, the lake of Constance, and Neufchatel.	Several shocks		Caused but little damage. The course of a river in Thurgovia was altered. The whole year was very stormy in Switzerland. Others give as the day of the month the 9th.	Bertrand; Coll. Acad.; Scheuchzer; Chron. German. u. Contin. Sleidani.
or 26.					

1.	2.	3.	4.	5.	6.
1533. Dec. 27. Bâle..... in Italy		Three shocks .....		.....	Lycosthenes; Merian, <i>loc. cit.</i> v. Hoff.
1534. Oct. 22. Zurich and the neigh- bourhood.		Several shocks.....		v. Hoff gives the date 11-12 Oct. (O. S.?), and says that it was felt at Baden, Bremgarten, Mellingen, Bruck, Windisch and Königsfelden. Followed by a violent storm in the cantons of Zurich and Lucerne. Ragor says that he him- self was born at Windisch during this earthquake. The earth opened, and a little town was swal- lowed up. On the 23rd March of this year an exceedingly violent eruption of Etna began, and lasted until the middle of April. Accompanied by subterranean noises like thunder. On the 11th Etna burst into eruption.	Bertrand; Coll. Acad.; Ragor.
1536	Valley of Mazaria in Sicily.				Fazelli, p. 212.
1537. May 1 Naples, and throughout to 13. the whole of Sicily.		Slight shocks			Fazelli, p. 55; Collection Acadé- mique.
— Sept. 26. Pozzuoli near Naples ...		Ditto, continuing slightly the whole of this year and the next.			Diarium Hist. p. 292.
—	Bâle.....	Several shocks.....			Merian; Collection Académique. Bertrand; Coll. Acad.; Merian.
1538. Jan. 20 Ditto				Both at Bâle, and throughout the canton, igne- ous meteors were seen after the shocks.	
or 28.				On the 29th at about 2 o'clock at night, Monte Nuovo was raised, and afterwards entered into eruption.	Maria della Torre, Storia e fenomeni del Vesuvio, p. 61; Hamilton; Pietro di Toledo; Kircher, Mund subt., and many other authorities.
— Sept. 27 Pozzuoli, Naples, and all and 28. through Calabria.		Almost continuous shocks for these two days. More than twenty violent ones. All, however, ceased as soon as the erup- tion began.	The sea retired many paces from the shore.		
—	Quito and the country round.	Very violent		Followed by an eruption of Ruchu Pichincha ...	Hist. Gén. des Voyages, t. xix. p. 82; v. Humboldt, Ideen zur geogr. u. s. w. der Tropenwelt, p. 51.
1539. June 27. The Saxon Erzgebirge, 7 p.m. and some other parts of Germany.				Lycosthenes mentions Chemnitz as having ex- perienced this earthquake, and gives the date 25th June, 1540.	Agricola, Mineral. Schriften, Deutsch. übersetzt, t. ii. p. 209; Chron. German.
1540. July 18. Bâle.....					Merian.
— Dec. 14. In Germany, probably as before in the Erzge- birge.				Lycosthenes gives this date, but it should pro- bably be 1539.	Lycosthenes.
1541. End of Algiers.....				Accompanied by a violent tempest	Collection Académique.
1 Oct.					

or 12 or 13. Dec. 12. 23rd hour.	Constantinople. Sicily, Italy, and Turkey; especially in Sicily.	.....	.....	Syracuse, Leontium, Calatagirona, Catania, and several other towns in Sicily were ruined. The fountain of Arethusa and the wells of Syracuse for some days gave forth water more salt than usual.	p. 560; v. Hoff. Fazelli, pp. 71 and 567; Huot, p. 110; Goldwurm; Coll. Acad.
.....	Mexico.....	.....	.....	.....	Memoir of M. Perrey on the earthquakes of Mexico and Central America.
1544. Jan.	Calabria .....	.....	.....	Many houses were almost destroyed.....	G. Fiore, <i>loc. cit.</i> p. 287.
1545. Sept. 6.	Throughout Europe .....	.....	.....	.....	Mémorial de Chronologie, t. ii. p. 915.
1546	Mechlin, Brabant, &c. ....	.....	.....	Probably the same with the last	A pamphlet in the British Museum.
.....	In Palestine.....	.....	.....	Joppa, Sichem, and Rama were especially injured. The bed of the Jordan remained dry for two days (?).	Rivander, in suo promptu.
1548. Feb. 9. After 4 A.M.	Bâle.....	.....	.....	The shock awoke Lycosthenes, who says that he felt as if his bed were raised up by some other person.	Lycosthenes; Bertrand; Coll. Acad.
1549. Mar. 12.	Brussels .....	.....	.....	.....	Communication of M. Quetelet to M. Perrey.
..... May 31.	In Calabria .....	.....	.....	.....	G. Fiore, p. 287.
1550	In the kingdom of Naples.	.....	.....	Ariano was swallowed up. The same year (possibly at the same time) there was an eruption of Vulcano in the Lipari Isles.	Philip. Bergomat., p. 368.
1551. Jan. 26.	At Naples .....	.....	.....	.....	Mém. de Chronol. t. ii. p. 915.
..... 28.	Lisbon .....	.....	.....	200 houses thrown down. Preceded by a remarkable aurora borealis.	Lycosthenes; Frytschius.
..... May 25.	Rygate, Croydon, and Darkin, in Surrey; especially at Darkin.	.....	.....	Kitchen utensils and other moveables were thrown from their places.	Strype's Memor. Eccles. vol. ii. p. 272; Collec. Acad.
1552. Mar. 6.	The Saxon and Bohemian Erzgebirge; especially at Freiberg, Joachimsthal, Eger, Bucha, and in Lusace.	.....	.....	.....	Fincelius and Rivander.
..... April 20. At twilight.	In the chain of the Sudetes, as at Meissen and Freiberg.	Lycosthenes.

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1552. Sept. 16. 6 P.M.	Bâle and the Valais. Also felt in Hungary, according to the Mém. de Chronol.	Slight	Lycosthenes; Bertrand; Collection Académique.
1553. Aug. 17. Between 7 and 8 P.M.	In the basin of the Elbe; principally at Meissen in Saxony.	.....	.....	Ruined some buildings	Lycosthenes; Eberus; J. Aug. de Thou, Hist. t. i. p. 409 (fol. edit.).
1554. Mar. 21. Midnight.	Belgium. (The author who reports this lived at Louvain.)	One violent shock .....	.....	Accompanied by a subterranean noise like bellowing, and a brazen sound (æneus clangor) like the noise of many chariots in rapid motion. Vessels placed in elevated positions were thrown down.	Cornelius Gemma, De Nat. Div. Caract. lib. ii. p. 23.
— 22. 4 P.M.	Ditto	Two violent shocks.....	.....	.....	Ditto.
— Apr. 30. 5 P.M.	Ditto	Three consecutive shocks. ....	.....	.....	Ditto.
1555. (In the second month of the Chinese calendar.)	In the provinces of Chan-si and Honan in China.	.....	.....	.....	De Mailla, Hist. gén. de la Chine.
1556. Jan. 15. — 24.	Strasbourg..... Bavaria, Austria, in the Windischmark, Hungary, Croatia, Dalmatia, and Moravia.	The shocks lasted for four days. ....	.....	Twenty-six townships (Ortschaften) were ruined	Pauli Eberi calendarium historicum. Ditto.
— April 1. 11 P.M.	Province of Chan-si in China.	Lasted two hours. Extremely violent.	.....	According to v. Hoff, a piece of ground of sixty leagues in circumference was sunk by this earthquake, and a lake produced in its stead. Very many people lost their lives. All the fortifications of the town were ruined. v. Hoff, quoting Bernherz, places this event in May, in connexion with the following account.	De Mailla, Hist. gén. de la Chine, t. x. p. 321.
— — ...	The town of Rossana (Rossana Astropiæ), and the country round for a distance of thirty miles.	Very violent shocks	.....	.....	Lycosthenes.
— May 10. 2 hours before dawn.	Constantinople	Very violent .....	.....	Frytschius gives the date 10th March, and says that it lasted three days, doing great damage to houses, &c.	Eberi calendarium historicum.
— — — — —	Japan .....	.....	.....	.....	Kämpfer, v. Bohm, t. i. p. 120.
1557. Apr. 24.	Zurich and Winterthur. Also in the Canton de Vaud, at Yverdun.	Several shocks.....	.....	Accompanied by much noise, but little damage.	Bertrand; Collection Académique; Scheuchzer.

1558. Apr. 13.	Sienna, Florence, and other parts of Tuscany.	Very violent	.....	The water (fountain?) of Fontebranda rose three times to the height of more than two fathoms.	t. xx. p. 96. Libro di Mem. delle Monache del Santuccio.
— May 17.	Thuringia.....	.....	.....	Followed by disastrous inundations	Frytschius.
1559. Aug. 25.	Val di Diano (Calabria?)	Very violent	.....	Did considerable damage	G. Fiore, <i>loc. cit.</i> p. 287.
—	Cattaro, not far from Ragusa.	.....	.....	.....	Dogliani, p. 655.
1560. Dec. 13.	Vienna.....	.....	.....	Accompanied by a violent storm, with thunder and lightning, and by a noise like that of a carriage in motion.	Epit. rer. gest. sub Ferdin. I, imper. Rer. German. S. Schard, t. iii. p. 2168.
— 27. Midnight.	Zurich	A feeble shock	.....	Followed, the same night, by an aurora borealis of great brilliancy, seen not only at Zurich, but all over Germany. The evening before, in the Duchy of Wurtemberg, a piece of land of twenty feet square suddenly sank to the depth of thirty-six feet, and water then rose at the bottom to the height of nine feet.	Scheuchzer, p. 74.
1561.	In the kingdom of Naples.	Several violent shocks	.....	Many buildings thrown down, and the courses of streams altered.	Frytschius.
1563. Jan. 17.	In Belgium, probably at Louvain.	.....	.....	Accompanied by thunder and wind, and followed by great rains.	Corn. Gemma, <i>loc. cit.</i> p. 41.
— June 13. About noon.	Cattaro, not far from Ragusa, and the villages round.	.....	.....	Did great damage both to this town and others.	S. Schard, t. iii. p. 2201; P. Justiniani Hist. Venet. p. 310; v. Hoff.
—	In Illyria.....	Violent	.....	Probably simultaneous with the last.....	J. Aug. de Thou, Hist. t. ii. p. 381.
1564. July ...	At Nice, and in Provence	.....	.....	Accompanied by loud claps of thunder. Seven villages were destroyed.	Gazette de France of the 24th Jan. 1772; Mém. de Chron. t. ii. p. 915; Mém. de Turin, t. xix. p. 158.
1565. Feb. Night between 7 and 8.	In Hundsrückén, on the Moselle, and on the Rhine.	Several shocks	.....	.....	Chron. Univers.
—	Bâle.....	Violent shocks	.....	.....	H. C. Wieland's MS. Chronik, 1684.
—	Neighbourhood of Nice	.....	.....	Some hamlets were swallowed up by the earth	Nigrin's continuation of Richter's Chronik, Frankfort, 1598.
—	Guatimala, especially in the neighbourhood of the volcano Paraya.	.....	.....	Accompanied by an eruption of the volcano ...	v. Humboldt in der Hertha, Bd. vi. S. 138; v. Buch, Descrip. des îles Canaries, p. 510.

1.	2.	3.	4.	5.	6.
1568. July 26. At Meissen At night. 1569. Apr. 16. Berne 9 o'clock (A.M. or P.M.?). May 14. Louvain Midnight.		A slight shock..... Two hours and forty minutes later, there were two other shocks felt consecutively, of which the latter lasted three or four minutes. A slight shock..... Violent shocks, but lasting a very short time.		Accompanied by a hoarse noise. Gemma says of the first shock, "ferebant tum temporis et spectra rursus in aëre pervagata." And of the second, "colores tum in aëre vidi varios, inusta specie, valdè terribiles."	Georg. Fabricius. Benedict Martin. Corn. Gemma, <i>loc. cit.</i> p. 64; Coll. Acad.; v. Zach, <i>Corresp. astron.</i>
— Aug. 6. Bâle..... — Dec. Constantinople		A slight shock..... Violent shocks, but lasting a very short time.			Wieland's Chronik. Coll. Acad.
— Night between 13 and 14. —	In different places, principally in the island of Cyprus.			Probably simultaneous with the last.....	P. Justinian, <i>loc. cit.</i> p. 326.
1570. Nov. 17 to 30. Beginning at 9 ^h 45 ^m (A.M. or P.M.).	Venice, Ferrara, Florence, Modena, Reggio, and all the adjacent country; especially at Ferrara.	Daily shocks for the time mentioned, and recurring at intervals for a whole year. In the first three days there were 84, of which 36 were very violent. Several shocks.....		Great damage done to buildings at Ferrara	S. Schard, t. iii. p. 2462; P. Justin. Hist. Venet. p. 336; J. Aug. de Thou, Hist. t. ii. p. 777.
— Dec. 6. Strasburg, and Spires... —	In the Grecian Archipelago..			Inundations of the Rhine and Rhone	J. Aug. de Thou, Hist. t. iii. p. 36. Acta Eruditorum, an. 1688, p. 517.
—	St. Jago in Chili, extending over a very large tract of country.		Thesea retreated some leagues (?) from the coast.	Great landlips took place from the mountains.	Coll. Acad.; v. Hoff quotes Molina.
1571. Feb. 17. 6 P.M.	Kinnaston, near Marcle hill, Herefordshire. Also in Belgium.			A vast landlip took place, the motion continuing from the time mentioned (on Saturday) until the Monday evening following. The piece of ground moved was 400 perches long by 160 wide (containing twenty-six acres), and about thirty feet deep. It moved about forty paces.	Baker's English Chronicle, p. 419; De Larrey, Hist. d'Angl. t. iii. pp. 218 and 378; J. Aug. de Thou, Hist. t. iii. p. 85; Coll. Acad.; Phil. Trans. 1750.

1571. Feb. 19. Bale, Strasburg, and all Between 8 through Alsace. and 9 A.M.	.....	.....	.....	The season was early, the winter cold, and the summer very hot. On the 12th, 13th, 14th, and 15th, auroræ boreales. Scheuchzer gives the date 1572.	Huot, Géol.; Hondorff, Theatrum historicum.
Mar. 5.	Constantinople, and the country for four miles round.	.....	.....	.....	Beuther.
Nov. 1.	Inspruck .....	.....	.....	.....	Collection Académique.
.....	Tuscany and Lombardy. Continuation of the shocks of the year before.	.....	.....	.....	Prevost, Hist. gén. des Voyages, t. i. p. 325; Raspe, De nov. insulis, p. 111. Rer. German., S. Schard, t. iii. p. 2509.
1572. Jan. 6. 9 P.M.	Island of St. Michel, Azores.	.....	.....	Threw down a mountain in the island	Ditto and Franck. p. 968.
— — — 28. 7 A.M.	Inspruck. Also, about the same time, at Mu- nich and Augsburg.	.....	.....	Accompanied by the fall of aérolites..... Caused some damage to buildings. v. Hoff gives as date the 22nd Jan.	.....
.....	In Switzerland; especial- ly at Lausanne, Aigle, and the Haut-Valais.	.....	.....	.....	Bertrand; Scheuchzer; Coll. Acad.
1573. Sept. 20.	Zurich and the adjacent country.	.....	.....	.....	Bertrand; Coll. Acad.
— Dec. 20.	Ditto .....	.....	.....	.....	Scheuchzer.
— — — 21.	The whole of the canton of Glaris.	.....	.....	Accompanied by subterranean noise, and followed by some damage to houses, &c.	Bertrand; Collection Académique.
1574. Feb. 26. Between 5 and 6 P.M.	York, Worcester, Glou- cester, Bristol, Here- ford, and the neigh- bouring counties.	.....	.....	At Tewkesbury and some other places plates and books were thrown from their places. The people who were on their knees in the chapel of Norton, were almost all thrown down. A part of Ruthen Castle was ruined, and the bell in the market house of Denbigh sounded two strokes. The town gate of Cornevin was thrown into the fosse.	Stow's Chronicle, p. 679; Coll. Acad.; Rév. du Globe.
May 3.	Geneva and the neigh- bourhood.	.....	.....	.....	Spon, Hist. de Genève, t. i. p. 521; Bertrand; Coll. Acad.
June 30.	Zurich and the neigh- bourhood.	.....	.....	.....	Bertrand; Scheuchzer.

1.	2.	3.	4.	5.	6.
1574. July 30.	Bâle. Offenburg. (In Baden, or in Transylvania?)	One shock .....	.....	.....	.....
1575. April 24.	Geneva.....	.....	.....	.....	.....
— July 27.	Lisbon	Violent .....	.....	Caused no injury to buildings	Spon, Hist. de Genève, t. i. p. 521; Bertrand; Coll. Acad. Tavares, in Balbi, Essai sur le Por- tug. t. i. p. 102. Collection Académique. Baker's English Chronicle, p. 420.
—	Laybach in Carinthia.... The Thames at London	.....	.....	.....	.....
—	The district of San Sal- vador in Mexico.	Disastrous earthquake .....	.....	.....	Ennery et Hirth, Dict. de Géogr. t. iv. p. 508.
1576. Oct....	Bâle.....	Several shocks.....	.....	.....	Ryffische Chronik (1514-1584).
— Nov. 20, 21 and 22.	Ditto	More shocks .....	.....	.....	Ditto, and Wurstisen's Chronik; Bertrand; Coll. Acad.
— Dec. 20 and 21.	Ditto	Ditto .....	.....	Accompanied by very intense cold	Bertrand; Coll. Acad.
1577. Feb. 27.	Ditto. Also felt at Geneva, and in the Pays de Vaud.	One shock .....	.....	.....	Ragor.
— Sept. 22. Between 2 and 3 A.M., at 5 P.M., and during the night.	Bâle, and all through Switzerland, especially in the Pays de Vaud, at Aigle.	Three shocks at the times mentioned; the second less violent than the first, and the third, according to one of M. Perrey's memoirs, more vio- lent, and according to another, less so, than the second.	.....	All through the course of this year many shocks were felt in different places in Switzerland.	Bertrand; Stumpf's Schweizer Chronik.
— 23.	Ditto .....	.....	.....	.....	Ragor.
— 24.	Ditto .....	.....	.....	.....	Ditto.
— 29.	Ditto .....	.....	.....	.....	Ditto.
— Oct. 5.	Bâle.....	.....	.....	.....	Ragor; Wieland's Chronik.
— 18.	Ditto .....	.....	.....	.....	Ditto.
— Nov. 30.	In Mexico (lat. 13° 32' N.) "A very remarkable earthquake."	"A very remarkable earthquake." Several shocks.....	.....	.....	y. Humboldt, loc. cit. t. ii. p. 297.
—	Strasburg, Hagenau, and the neighbouring places.	.....	.....	Probably simultaneous with some of the earth- quakes at Bâle.	Beuther.

Year	Island of Cyprus	Very violent shocks		The people were driven to live in the open country.	
1578. (May 18; Whitsunday) 10 P.M.	Ofen in Hungary			During a storm of thunder and lightning	Tarcagnota, <i>loc. cit.</i> t. v. p. 297; Sleidanus, t. iii. p. 63. Bernherz.
June 17.	Peru, especially at Lima				Ulloa, <i>Hist. gén. des Voyages</i> , t. xx. p. 31; v. Humboldt, <i>Voyage</i> , t. i. p. 317. Bertrand.
Sept. 28.	Throughout Switzerland.				
	Most violent at Zurich.			The town was ruined. This same year, or the following, an eruption of Etna.	The town was ruined. This same year, or the following, an eruption of Etna.
	Town of Sciacca in Sicily.				
	Java				<i>Hist. gén. des Voyages</i> , t. ii. p. 401; Raffles's <i>History of Java</i> , t. ii. p. 234 and <i>Append.</i> ; John Prior's <i>Voyages in the Indian Ocean</i> . <i>Mém. de Chronol.</i> t. ii. p. 915.
1579. Jan. 26.	Tours, Orleans, and Chartres.				
1580. April 6. 6 P.M.	Throughout England, especially at London, Dover, and the whole of Kent. Also in France at Boulogne, Calais, Paris, &c., in Belgium at Brussels, Malines, Cologne, &c., in Zealand, and Holland. Most violent in England.	At London and the environs, the earthquake lasted about one minute. Two others light shocks were felt all through Kent, namely, at 9 and 11 P.M.	The great bells at Westminster and other places were made to sound. Portions of several buildings, and very many chimneys were thrown down in London. The heavens were serene, and the air quite tranquil.		Camden, <i>Hist. of Elizabeth</i> , p. 314; De Larrey, <i>loc. cit.</i> pp. 330 and 368; <i>Phil. Trans.</i> vol. xvi. p. 660; Stow's <i>Chron.</i> ; De l'Estoile, <i>Journ. de Henri III.</i> t. i. p. 198; J. Aug. de Thou, <i>Hist.</i> t. iii. p. 766.
May 1. Midnight.	County of Kent, especially at Ashford. Also in the Netherlands, as far as Cologne.	Very considerable			Camden, <i>loc. cit.</i> ; J. Aug. de Thou, <i>loc. cit.</i> , and p. 784; <i>Coll. Acad.</i>
	In Spain, the Pyrenees, and as far as Bordeaux.				
or 1581.	In Iceland	Very violent	An eruption of the volcano Katlegia took place about the same time, but whether it was exactly simultaneous with the earthquake or not, is doubtful.		<i>Mémorial de Chronologie</i> , t. ii. p. 915. v. Hoff.
1582. May 1.	Naples and Pozzuoli		Some buildings were thrown down		Vivenzio, p. 11.
	In Peru, especially at Arequipa. Also felt at Lima.	Ditto	Arequipa was ruined. v. Hoff mentions an earthquake in this year, in the district of Angoango, Peru, which he thinks may be a distinct one.		Collection Académique.

1.	2.	3.	4.	5.	6.
1583. Jan. 13. — May 5.	Blackmore, Armitage, in Dorsetshire, Eng- land. Mans (in France?)	.....	.....	Accompanied by a landslip of more than three acres, which moved about 900 feet. Possibly not a true earthquake. Accompanied by thunder and lightning, which set fire to the church of Saint-Julien.	De Larrey, <i>loc. cit.</i> , p. 378; Cam- den, <i>loc. cit.</i> , p. 366; Stow's Chro- nicle. De l'Estoile, Journal de Henri III. t. i. p. 259.
1584. Mar. 1. Afternoon.	Throughout Switzer- land, Burgundy, Dau- phin, and Piedmont. The town and lake of Gryffensee, two leagues from Zurich, were very violently shaken.	At Geneva the shocks lasted ten to twelve min. They recurred all through the districts here mentioned for at least ten days, there being a violent shock, felt especially at Bâle, on the 10th.	The waters of the lake of Geneva were much agitated and raised more than twenty paces above their usual level.	The weather was very fine and serene. Many chimneys, buildings, &c. were thrown down.	Spon, Hist. de Genève, t. i. p. 325; Bertrand; Coll. Acad.; Mém. de Chronol., t. ii. p. 916.
..... 1586. July 9.	Japan In Peru, extending 170 leagues along the coast, and 50 leagues into the interior. Most vio- lent at and about Lima.	..... Several violent shocks	..... The sea came in four- teen fathoms high immediately after the shocks, and in- undated the country fortwo leagues from the shore.	..... The town of Nangasuma was completely ruined. Hills were thrown down, and clefts opened in the earth of such a size, that a musket shot would not reach from one end to the other; and out of these there came an insupportable smell of sulphur.	v. Hoff. v. Hoff quotes Bouguer; Coll. Acad.
— Sept.	Japan	Very violent	The sea inundated the country, carrying away houses with their inhabitants.	The town of Nangasuma was completely ruined. Hills were thrown down, and clefts opened in the earth of such a size, that a musket shot would not reach from one end to the other; and out of these there came an insupportable smell of sulphur.	Kämpfer, v. Dohm, t. i. p. 236; Pater Hay de rebus Japonicis.
—	Guatemala .....	.....	.....	The city of Guatemala was ruined. An eruption of the volcano of Fuego in Guatemala took place at the same time. There were also eruptions in this year in Java and Banda.	Humboldt in Hertha, Bd. vi. p. 138; v. Buch; Coll. Acad.
1588. Mar. 25. A little be- fore noon.	From Nantes to Saumur in France. Also, less vio- lently, in some parts of Normandy.	.....	.....	The houses shook, and the waters of the Loire appeared to boil. In Normandy accompanied by a sort of smoke which tinged the air yel- lowish for an hour.	Mézerai, Hist. de France, t. iii. p. 478; De Larrey, Hist. d'Angl., t. iii. p. 529; J. Aug. de Thou, Hist. t. iv. p. 558.
— Nov.	Saalfeld in Thuringia ...	.....	.....	A cleft opened during this earthquake in the mountain Culon or Culm of 10 feet wide and 100 deep.	Coll. Acad.

1890.	In the southern part of France.				..... probably the same with the event mentioned under 25th March.	Beuther; J. Hedericus; Coll. Acad.; Chr. Matthias, Theat. Hist. p. 822; Breaserus Millenarius, t. vi. p. 522; Hist. Germaniae (edit. Elzevir), t. i. p. 414; J. Aug. de Thou, Hist. t. v. p. 13; Funecius, &c.
Sept. 15.	Ditto, especially at Vienna, Prague, and many other places, suffered considerably in buildings, &c.				Vienna, Prague, and many other places, suffered considerably in buildings, &c.	Ditto.
Between 5 and 6 P.M.	Slight shocks					
1591.	Ferrara.....	Many shocks, recurring continually for 7 or 8 months.				Mém. de Chron. t. ii. p. 917.
July 26.	The Azores, especially St. Michel; and the sea for twenty leagues round.	The shocks recurred four times at Terceira and Fayal, but at St. Michel they were perpetual for fifteen days, and did not cease entirely for some time after.			The surface of the islands was completely changed; plains were raised into hills, and hills levelled to plains. Numbers of buildings were absolutely ruined. In one place a stream of clear water burst forth from the earth, continued running for four days, and then suddenly dried up.	Lindschoten in Prevost, Hist. gén. des Voyages, t. i. p. 325; Raspe de nov. insulis, p. 111.
Sept. 3.	Bâle.....					Wieland's Chronik.
1592.	Faenza in Italy					Collection Académique.
Jan. 9.	Geneva.....	Several shocks.....				Bertrand; Coll. Acad.
May 30.	Tuscan	Great earthquakes			Accompanied by an eclipse of the sun	Istoria di Chiusi in Toscana, Muratori, t. xxvi. p. 1114.
Nov. 5.	Neufchatel and the neighbourhood.				Large masses of rock were cleft from top to bottom.	Bertrand; Coll. Acad.; Huot.
.....	District of San Salvador, Mexico.	Disastrous				Ennery et Hirth, loc. cit.
1594. (On St. Martin's day.)	In the Canton of Glaris.....				Followed by the fall of a mountain near, which did some damage.	Bertrand; Coll. Acad.; Scheuchzer.

1.	2.	3.	4.	5.	6.
1594	Naples and Pozzuoli. Also, according to v. Hoff, in the Canton du Vaud.	Violent shocks.....	The sea retired 200 paces from the shore.	.....	Kircher, Mund subter., lib. iv. s. 2. c. 10; Coll. Acad.
1595. Aug. 6.	The town of Meaco in Japan.	.....	.....	The town was ruined by the earthquake. Kämpfer gives the date 1594.	Dan. Bart., Asia, p. 2. l. ii.; Kämpfer v. Dohm.
1596. July 22.	Japan .....	.....	The sea rose above its ordinary level.	.....	Preceded by a rain of ashes. The towns of Ochinofama, Famaoqui, Ecuero, Finco, and Cascicanoro were ruined.
.....	Calabria	Three violent shocks	.....	.....	G. Fiore, <i>loc. cit.</i>
1597. Jan. 29. From the 22nd hour to the 1st hour of the night.	Luciana, and the hills about Pisa.	Five shocks .....	.....	.....	"Notizia estratta da una vecchia chronaca di un Parrocoo di Lu- ciana."
July 23.	Perth, and other parts of Scotland.	.....	.....	.....	Thomson's Annals of Philosophy, vol. viii. p. 365.
— 28.	Lisbon .....	.....	.....	The houses of three entire streets were thrown down, and the hill of St. Katharine was cleft in two.	Mém. de Chronol. t. ii. p. 915; Balbi, Essai sur le Portug. t. i. p. 102.
1598. July 22.	Ditto .....	.....	.....	People walking in the streets were thrown to the ground.	Balbi, <i>loc. cit.</i>
—	Japan	Many shocks during a whole month, some very violent.	.....	A volcanic eruption in the isle of Banda took place this year.	Kämpfer v. Dohm, t. i. p. 237.
1599. Nov. 8, 12, 13, and 14.	In Calabria	Very violent shocks...	.....	.....	G. Fiore, <i>loc. cit.</i>
1600. Sept. 16.	Upper part of the lake of Geneva.	.....	.....	.....	Preceded in October by unusually heavy and continuous rains, which caused most disastrous inundations.
—	Norcia and Florence ...	Several shocks .....	.....	The ground beneath the lake where the Rhone flows out from it, was raised and sunk so as to make the waters of the lake appear to ebb and flow three or four times.	Spon, Hist. de Genève, t. i. p. 417; Bertrand; Coll. Acad.
—	Arequipa in Peru .....	.....	.....	Some houses thrown down	Ch. Mathias, Theat. Hist. p. 623.
—	The island of Bornholm in the Baltic Sea.	.....	.....	Accompanied by darkness as of clouds, and a thick rain of ashes for twenty days.	Collection Académique.
1601. Feb. 8.	Frankfort on the Maine.	Violent.....	.....	.....	v. Hoff.
— Aug. 10.	In the kingdom of Naples.	Very great .....	.....	Did no damage ..	Lerner's Chronik; Kriegt. Vivenzio, p. 11.
9 A.M.	.....	.....	.....	.....	.....

Asia. Most violent in Switzerland, Austria, Bohemia, Bavaria, Swabia, Alsace, and part of the Netherlands	was stopped. Followed in Switzerland by heavy rains, and consequent inundations. It was felt at Haguenau, Strasburg, Spire, Frankfurt, and Cologne, and in Wurtemberg, and Hesse. At Gotha, a steeple was thrown down.	Chronik; Beuther; Lerner; Kriegk, &c.
Dec. 24. London	.....	Camden, <i>loc. cit.</i> p. 831.
1602. June 28. Zurich and the neighbourhood. 6 A.M.	Several shocks.....	Bertrand; Scheuchzer; Coll. Acad.
Dec. At In Calabria	Several tremblings.....	Pilla, <i>Istoria del tremuoto</i> , &c. p. 202.
the end of the month.	.....	Archivio del regio Scrittojo, quoted by Signor Pilla.
1603. Jan 25. Sienna	Terrible earthquakes.....	Claude Malingre, dit de St. Lazare, <i>Remarques d'Estat. et d'Hist. de 1600 à 1632</i> , p. 57.
Aug. or District of Waradin in Croatia.	Very violent.....	v. Hoff.
..... In the country situated between the Carpathians and the Eastern Alps.	Probably the same with the last.....	Bertrand; Basler Chronik; Coll. Acad.
1604. Apr. 14. Bâle	.....	G. Fiore, <i>loc. cit.</i> ; Hnot.
Between 9 and 10 o'clock (A.M. or P.M.?)	.....	Frezier, <i>Reise in die Südsee in den Jahren 1712-14.</i>
Sept. 16. In Italy	Very great.....	Kämpfer v. Dohm, t. i. p. 237.
Nov. 26. Arequipa in Peru	.....	Bertrand.
1606..... Japan	.....	.....
1607. April 2. Throughout the Canton du Vaud, especially at Yverdun. Also felt at the same time in several other parts of Europe.	.....	.....
July 15. At Ebertzlingen, near Würzburg.	Threw down a portion of a mountain, and discovered various subterranean abyesses, &c.	Claude Malingre, <i>loc. cit.</i> p. 125; Sleidanus, t. iii. p. 1308.
1608. Nov. 8. Aberdeen	.....	Thomson's <i>Annals of Philosophy</i> , vol. viii. p. 365.

1.	2.	3.	4.	5.	6
1609. Jan. 19.	In the Thames	No shock mentioned	An extraordinary flux and reflux of the tide twice within an hour.	.....	De Larrey, <i>loc. cit.</i> p. 673.
— June 8. 14th hour.	In the kingdom of Naples.	Slight .....	.....	.....	Vivenzio, p. 11.
— July 20.	Nicastro in Italy.....	.....	.....	Caused some damage	Fiore, <i>loc. cit.</i> p. 289.
— Nov. 27.	Lima and Arequipa in Peru.	.....	.....	.....	Coll. Acad.; v. Hoff.
1610. Nov. 29.	Bâle.....	.....	.....	Threw down a part of the walls of the town, and was attended with a subterranean murmuring noise.	Bertrand; Basler Chronik; Scheuchzer; Coll. Acad.
1611. Jan. 15.	In the valleys of Switzerland and Piedmont.	One of the most violent shocks ever heard of here.	.....	.....	Vassali—Eandi, Rapport, &c., p. 126, quotes Gilleo, Hist. des Églises Vaudoises, c. 52. p. 385.
—	Constantinople .....	.....	.....	.....	Edinburgh Encyclopædia, Article Chronology.
1612. Jan. 31.	Nice and the environs. According to the Coll. Acad., in several places in the Mediterranean.	.....	.....	This year was remarkable for tempests.....	Mém. de Turin, t. xix. p. 158; Coll. Acad.
— Feb. 29.	Bâle.....	.....	.....	Without damage.....	Bertrand; Basler Chronik; Scheuchzer; Coll. Acad.
— May.	Bergen in Norway	Violent.....	.....	.....	MS. Hist. of Bergen, by Edvard Edvardsen.
Night between 15 and 16.	.....	.....	.....	.....	.....
— Nov. 8 to Dec. 7.	Westphalia, and other parts of Germany, especially at Bielefeld, and the castle of Spamerberg. Also felt in the island of Candia, and several places in the Mediterranean.	At Bielefeld and Spamerberg the shocks occurred almost daily during the whole time.	.....	The trees appeared agitated, as if by a high wind, although the air was unusually calm. In Candia many buildings were thrown down, and ships sunk.	Coll. Acad.; v. Hoff; Mercure Français adj. à l'an 1612, p. 3.
1614. Feb. 14.	Waradin in Transylvania, and the neighbourhood.	Very violent .....	.....	Men and other animals could not remain standing.	Mercure Français, 1614, p. 571.
— 17. At night.	Bâle.....	.....	.....	Accompanied by a great noise	Bertrand; Scheuchzer; Basler Chronik; Coll. Acad.

— May 4... round. Island of Terceira in the Azores.	.....	.....	Ruined the towns Praya and d'Angra	Coll. Acad.; Buffon, Hist. Nat. t. ii. p. 312 (edit. of 1750).
— Sept. 24. After mid-night. Bâle.....	.....	.....	Accompanied by subterranean noises as before.	Bertrand; Basler Chronik; Scheuchzer; Coll. Acad.
— Nov. 24. 4th hour of the night. 1615. Calabria .....	.....	.....	.....	Fiore, p. 289.
— Be- Neuhäusel in Hungary .....	.....	.....	.....	Bernherz.
— Feb. 20. In Austria, Bohemia, and Hungary; especially at Prague.	.....	.....	Accompanied by great subterranean noises, but without causing any damage.	Ditto.
— Japan .....	.....	.....	.....	Kämpfer v. Dohm, t. i. p. 238.
1616. Jan. 12. 4 P.M. Naples .....	.....	.....	.....	Vivenzio, p. 11.
— March. Different parts of Switzerland.	.....	.....	Many buildings, &c. thrown down	Claude Malingre, <i>loc. cit.</i> p. 251.
— Beginning of the month. July 28. At sea, at the entrance of the Straits of Le-Maire.	.....	.....	.....	Hist. gén. des Voyages, t. xvi. pp. 73 and 107.
— Aug. 2. Aleppo.....	.....	.....	The walls were shaken like the leaves of a tree.	Pietro della Valle, Voyage en Syrie, t. ii. p. 152.
— Sept. 7. Naples .....	.....	.....	.....	Vivenzio, p. 11.
— Japan .....	.....	.....	.....	Montanus, Japanische Gesandtschaft, p. 205.
1617. July 5. Freiburg in the Brisgau.	.....	.....	During this earthquake a great mass of rock fell upon a house and ruined it.	Bertrand; Scheuchzer; Coll. Acad.
— Aix in Provence .....	.....	.....	.....	Basler Chronik; Coll. Acad.
1618. June 4. Sardinia; especially at Cagliari.	.....	.....	According to the Journal Encyclopédique of the 15th Sept. 1771, the date of this event should be 1610.	Le Chev. Albert de Marmora, Voyage en Sardaigne de 1819 à 1825, p. 141.
— July 3. In Bearn, at the foot of the Pyrenees.	.....	.....	Steeple were shaken, and the bells made to toll.	Palassou, Mém. sur les Pyrénées, p. 261.
— Between 5 and 6, or 7 A.M. 6 and 6 .....	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
1618. Aug. 25. At night.	Throughout Switzerland, in the Pays de Vaud, the Valtelline, &c.	.....	.....	In the Grisons a mountain called Conto fell, and ruined a village; 1200 persons losing their lives. Neufchatel was considerably injured. Igneous meteors were seen soon afterwards.	Bertrand; Scheuchzer; Coll. Acad. Also the treatises of Barthol. Ahornius and J. Gross on this particular event.
1619. Jan. 5. — 19. Between 6 and 7 A.M.	In Calabria To the west of Frankfurt on the Maine, at Königsherg, Kronberg, Reiffenberg, as far as Boppard, St. Goar, and Ober-Wesel. Also at Neufchatel.	Very violent ..... .....	.....	Did much damage in various places The little river Nidda, not far from Frankfurt, ceased flowing. The Coll. Acad. gives the date Jan. 26 for the first-named places, and Jan. 29 for Neufchatel.	Fiore, <i>loc. cit.</i> p. 289. Sleidanus, p. 564; Lerner; Kriegk; Bertrand.
— Feb. 4. Shortly before noon.	In Peru, for a space of 160 miles long (and how wide?); especially at Truxillo.	The shocks lasted fifteen days.	.....	.....	Montanus, <i>Japanische Gesandtschaft</i> , p. 77.
— July...	Iceland	Shocks continuing until September.	.....	An eruption of Hecla at the same time.	v. Hoff.
1620. Jan....	Canton of Berne, especially at Frutigen, and extending as far as Geneva.	.....	.....	.....	Bertrand; Collection Académique.
— Dec.	Geneva.....	.....	.....	.....	Ditto.
—	Austria.....	.....	.....	.....	v. Hoff.
1621. May 20. During the evening sermon.	At Bâle and Neufchatel, in the Canton du Vaud, at Geneva, and in Savoy. Laybach in Carinthia ... Gonahpee in the island of Banda.	Several shocks ..... .....	.....	At Neufchatel several chimneys were thrown down. Accompanied by a volcanic eruption.	Spon, <i>Hist. de Genève</i> , t. i. p. 486; Basler Chronik; Bertrand; Coll. Acad. Collection Académique. Purchas, <i>Pilgrimes</i> , 5. l. p. 697.
1622. In March.	Upper and Lower Engadine (in the Grisons). Laybach in Carinthia ... Province of Siounie in the Caucasus.	..... ..... .....	.....	Followed by some thunder and lightning.....	Bertrand; Coll. Acad.
— .....	.....	.....	.....	.....	Collection Académique.
1623. Feb. 20 to 25.	Throughout the Valtelline, especially in the commune of Pergell in the Grisons; and at Clèves (probably Cle-	Many shocks each night for the time mentioned.	.....	The mountains Septimer and Major were so shaken, that pieces of rock were detached from them, and rolled down. During the summer red rain was remarked at many places in Germany and Switzerland.	Chakathouno quotes Aroquel of Tauris, <i>Hist. c.</i> 21 and 22. Bertrand; Scheuchzer; Coll. Acad.

Nov. 29.	In the Palatinate.....	.....	.....	Probably only the same with that mentioned v. Hoff. the following year, on the same day and month.	v. Hoff.
1624. Feb. 3. About the 15th hour.	In Calabria .....	.....	.....	.....	Fiore, <i>loc. cit.</i> p. 289.
— Mar. 21.	Argenta, near Ferrara.....	.....	.....	Three churches and more than 130 houses were thrown down. The Dresdner gelehrte An- zeiger, 1756, No. 2, places this event in the year 1625.	Mercurc Français, an. 1624, p. 185; Huot; Coll. Acad.
— Begin- ning of sum- mer.	Rome .....	.....	.....	Caused no ruins	Mercurc Français, <i>loc. cit.</i> ; Coll. Acad.
Nov. 29.	In the Palatinate!.....	.....	.....	.....	Dresdner gelehrte Anzeiger, 1756, No. 2. Collection Académique.
—	St. Michel in the Azores .....	.....	.....	A new island, of a league and a half long, was raised during this earthquake near St. Michel.	Bertrand; Collection Académique; v. Hoff.
1625. Feb. 22. 11 A.M.	Different parts of Swit- zerland. Also, ac- cording to v. Hoff, in Budjadingerland. (In Sweden?)	.....	.....	.....	Ennery et Hirth, <i>loc. cit.</i>
—	District of San Salvador in Mexico.	.....	.....	.....	v. Hoff.
1626. Jan.	Worms.....	.....	.....	Probably the same with the earthquake in Swit- zerland of the preceding year. v. Hoff gives it in that year, without, however, specifying the month or day.	Huot, Cours de Géol. t. i. p. 110.
Feb. 22.	Elbermannstadt in the district of Bamberg, duchy of Oldenburg. Also felt the same day at Sirifalco in Cala- bria, which town was ruined.	.....	.....	.....	.....
Mar. 27. 19th hour.	In Calabria .....	.....	.....	.....	Fiore, <i>loc. cit.</i> , p. 289.
— 30.	Ditto .....	.....	.....	.....	Ditto.

2.	3.	4.	5.	6.
April 4. In Calabria	Very violent shock. Lasted the time of saying an <i>Ave Maria</i> . Followed by 15 other shocks on the same day and by others at intervals until October. Many violent shocks lasting altogether forty days.	At Forliore and San Nicandro the sea retired more than two miles from the coast, and then returned again, inundating the country.	The towns of Girifalco and Catanzaro were ruined. Many clefts opened in the earth. Volcano in the Lipari Isles was in eruption. Thirty towns and villages are mentioned as having been ruined more or less by this earthquake, and 17,000 persons lost their lives. Clefts opened in the ground, lakes were dried up, mountains cleft, forests overthrown, and jets of water and mud thrown out of the wells. The shocks were accompanied by subterranean noises, and a smell of sulphur. v. Hoff, Huet, and Gaudisier give the date 1687.	Fiore, loc. cit., p. 289.
May ... Ditto	The shocks lasted five hours. The places most injured lay in a line running N. and S., from the eastern side of the Apennines at Bovino to the Adriatic Sea, at the mouth of the river Fortore. The shocks continued at intervals up to the 7th August.	The towns of Girifalco and Catanzaro were ruined. Many clefts opened in the earth. Volcano in the Lipari Isles was in eruption. Thirty towns and villages are mentioned as having been ruined more or less by this earthquake, and 17,000 persons lost their lives. Clefts opened in the ground, lakes were dried up, mountains cleft, forests overthrown, and jets of water and mud thrown out of the wells. The shocks were accompanied by subterranean noises, and a smell of sulphur. v. Hoff, Huet, and Gaudisier give the date 1687.	The towns of Girifalco and Catanzaro were ruined. Many clefts opened in the earth. Volcano in the Lipari Isles was in eruption. Thirty towns and villages are mentioned as having been ruined more or less by this earthquake, and 17,000 persons lost their lives. Clefts opened in the ground, lakes were dried up, mountains cleft, forests overthrown, and jets of water and mud thrown out of the wells. The shocks were accompanied by subterranean noises, and a smell of sulphur. v. Hoff, Huet, and Gaudisier give the date 1687.	Viviano, p. 11; Terra tremans Coll. Acad.; Mém. de Chronol.; Langlois, Dict. de Géogr. t. i. p. lxxi.; Anton. Foglia, Istoria discorso del gran terremoto, &c., Napoli, 1687; and Vera relazione, &c.; Theodorum Europeanum, t. i. p. 1064.
Aug. 7. Ditto, with the exception of Smyrna and Ragusa, which are not mentioned.	Lasted a quarter of an hour. Very violent shocks.	Ditto.	Ditto.	Ditto.
— 8. Ditto	Slight shocks.	Ditto.	Ditto.	Ditto.
— 24. Ditto	Very violent shocks.	Ditto.	Ditto.	Ditto.
Sept. 6. Ditto	Very violent shocks.	Ditto.	Ditto.	Ditto.
Laybach in Carinthia	Very violent shocks.	Ditto.	Ditto.	Ditto.
Luzon, one of the Philippine Isles.	Very violent shocks.	Ditto.	Ditto.	Ditto.
Ile 16. Island of St. Michel in the Azores.	Very violent shocks.	Ditto.	Ditto.	Ditto.

1629	lenburg. China .....	.....	.....	.....	violent thunder-storm.	1628, p. 167. Giac. Calderio, Tab. Geograph., &c. Collection Académique.
1630. July 5. At night.	In La Puglia. Also in Africa.	.....	.....	.....	7000 persons perished in La Puglia	
— — —	Mecca (Medina?) .....	.....	.....	.....	The weather was unusually cold	Bertrand; Coll. Acad.; Merian quotes the Chronicle of Joh. Jac. Scherer.
— Sept. 2. Two hours after mid- night.	St. Michel in the Azores.	.....	.....	.....	Threw down many houses, and the mosque where Mahomet was interred. Followed by a volcanic eruption, and rain of ashes.	Gaultier, Table Chronog. p. 869; Lettres Hist. et Polit. t. xiv. p. 262.
— Nov. 27.	Lima in Peru .....	.....	.....	.....	.....	Gaultier, <i>loc. cit.</i> ; Coll. Acad.; Mercure Français, an 1630, p. 506, et suiv.
— Dec. 25.	Bâle .....	.....	.....	.....	.....	Coll. Acad.; v. Hoff. Bertrand; Coll. Acad.; Wieland's Chronik.
—, or 1631.	Banda-Nera in the Mo- lucas.	.....	.....	.....	The earth opened in different places	Collection Académique.
1631. Aug. 24.	Sicily; especially the town Naso.	.....	.....	.....	.....	Ferrara, Campi flegrei della Sicilia.
— Dec. 16.	In and around Naples, and all the country near Mount Vesuvius.	.....	.....	.....	Followed by the greatest eruption of Vesuvius since the year 79. Brusoni and Sansovino give the date 1630.	Della Torre, pp. 62-66; Mercure Français, an 1631, p. 67; Gaul- tier, <i>loc. cit.</i> , p. 870; Dulac, t. iv. p. 390; Coll. Acad.; and several treatises on this particular event, quoted by v. Hoff.
— — — 20.	Ditto .....	.....	.....	.....	.....	Ditto.
1632. Middle of February.	Ditto .....	.....	.....	.....	Accompanied by a fresh outburst of Vesuvius ...	Ditto.
— Sept. 19.	Bergen in Norway, and the environs.	.....	.....	.....	The church trembled, and those present felt themselves raised into the air.	Hist. de Bergen, by Edvard Edvard- sen.
During the saying of the catechism(!)	Village of Nicolosi at the foot of Etna.	.....	.....	.....	Destroyed a great part of the village. Followed the year after by a great eruption at the same side of the mountain.	Ferrara, Campi flegrei; Mascolo; Carrera.
1633. Feb. Night between 21 and 22.		.....	.....	.....

1638. Mar. 27. 2½st hour.	In the two Calabrias, and the adjacent part of Sicily. The earthquake extended over a line of about 25 geogr. miles long, from Reggio to Terranova, running about S.W. and N.E.	One of the most violent earthquakes ever experienced here. Several shocks.	At Pizzo the sea retired 2 miles from the coast.	Accompanied by subterranean noise. 180 towns and villages were more or less ruined. The earth opened in many places, and at Vibona flames came forth. The direction was nearly parallel to that of the earthquake of 1626.	Ditto.
— — —	Canton of Uri, at Bel- linzona (Tessin), and some other places near.	Several shocks.			Bertrand; Coll. Acad.
— April — — —	Calabria and Sicily	Several slight shocks.			Fiore; Ferrara, &c. before quoted.
— — —	Sienna	Violent shocks, recurring for eight days.		Some other shocks were felt here during the spring and autumn.	Mem. del Macchi scrittore dello Spedale.
— May 3. — — —	Calabria and Sicily	Slight			Fiore; Ferrara, &c. as before.
— June 2. — — —	New England	Violent vibratory shock. Direction N.W. to S.E. Followed by a slighter one in less than half an hour.		Houses were thrown down, and people were unable to keep their feet.	Phil. Trans. for 1757, pt. i. p. 9.
— — —	Calabria and Sicily	Several more shocks.		Did a good deal of damage at several villages	G. Fiore, and the other authors before quoted.
— End of the year.	Chichester in England.	Several shocks		Did great damage. Accompanied by the smell of pitch and sulphur. The atmosphere was obscured as if by a cloud.	Dresdner gelehr. Anz. loc. cit.
— — —	In the markgraviate of Brandenburg.				Berlinische Nachrichten von Staats, und gelehrten Sachen, 1838, No. 19.
1639. In autumn.	Calabria, at the same places affected the year before.	Several shocks			Agatio di Somma.
— — —	Smyrna				Phil. Trans. t. xlviii. p. 820.
— — —	Ragusa				Partsch, Detonations-Phänomen. v. Meleda, p. 88.
1640. April 4. 3½ 15 ^m A.M.	France, Belgium, and Holland; especially at Brussels, Antwerp, Mechlin, and Namur. Also at Frankfort, and in parts of Westphalia and Lorraine; altogether a space of about 360 leagues	Three very violent shocks.	The ships in the ports of Holland were very much agitated, although it was quite calm.	Followed at night by luminous meteors	Dresdner gelehrte Anz. loc. cit.; Opera van Helmont., art. tremor, p. 90; Coll. Acad.; Mém. de Chronol.; Brachelii Hist. parti. p. 387.

1.	2.	3.	4.	5.	6.
1640. June 19 to July 18.	Calabria	Many shocks .....	.....	A place called Vadulato was ruined by a shock at dawn on the 19th June.	Agatio di Somma.
.....	Tabriz, and at the same time at Damascus.	Very violent .....	.....	Houses thrown down	Hadschi Chalifa.
1641. March	In Calabria	A feeble shock .....	.....	.....	Agatio di Somma.
May. Towards the end of the month.	Constantinople .....	.....	.....	.....	Comitis Bissaicioni Vita Sultani Ibrahim.
July 23 to Aug. 11.	In the Abruzzo .....	.....	.....	During this earthquake a mountain called Cayre, in the Abruzzo, gave out a quantity of water. Followed by inundations, and a flood in the river Laybach.	Physicalische Betrachtungen über das Erdbeben zu Lissabon, Vorrede. Collection Académique.
.....	Laybach in Carinthia .....	.....	.....	.....	v. Humboldt, Voyage aux régions équinoxiales, t. v. p. 5.
.....	Caraccas and La Guayra .....	.....	.....	.....	Physical. Betracht. über das Erdb. zu Lissabon.
.....	In Persia. Also felt at Bagdad.	Lasted altogether three days.	.....	In the province Aziron the towns Rikan and Riangan were ruined.	Dresdn. gel. Anz. 1756. No. 8.
1642. Some weeks before Easter. (Easter fell this year on the 20th April.)	In Holland	Several shocks.....	.....	Possibly only the event of 1640, wrongly reported.	
.....	.....	.....	.....	.....	Ditto.
.....	In Lombardy and Piedmont.	Ditto .....	.....	.....
April and May.	At Leghorn	A violent trembling....	.....	Probably simultaneous with some of the last-mentioned shocks.	Magri, Origine di Livorno, p. 153.
In the evening.	.....	.....	.....	.....	Dresdn. gel. Anz. loc. cit.; Lerner; Kriegk.
Nov. 18.	Spires, Worms, Mayence, Frankfort, and Cologne.	Many shocks .....	.....	.....	Bertrand; Coll. Acad.
.....	In the Canton of Neuchatel.	Three shocks .....	.....	.....	Collection Académique.
At night.	.....	.....	.....	Narrated by Abel Tasman	
1643. April 12.	At sea in 3° 46' S. latitude and 167° longitude (according to Berghaus E. longitude, reckoning from the Peak of Teneriffe), in the bay of the Cape of Good Hope in New	Several shocks, the first being the most violent.	.....	.....
At night.	.....	.....	.....	.....

1644. Feb. 16.	Laybach in Carinthia Geneva and the neighbourhood.	Several shocks.....	.....	Vesuvius, and Volcanillo. Followed by an abundant harvest	Collection Académique. Bertrand; Collection Académique.
— April 21.	Bâle.....	One shock .....	.....	.....	Wieland's Chronik; Brombach's Diarium.
— June 3 or 13. 5 A.M.	Geneva.....	More shocks .....	.....	.....	Bertrand; Coll. Acad.
—	Gap in Dauphiny.....	A terrible earthquake .....	.....	.....	v. Zach, Corresp. Astron. t. vi. p. 46.
—	Nice.....	.....	.....	.....	Ditto.
—	Poitiers	Several shocks.....	.....	.....	Dresdn. gel. Anz. 1756. No. 8.
—	Luçon, one of the Philip- pine Islands.	.....	.....	.....	Collection Académique.
1646. April 5. 22½ hour.	Leghorn and the adjacent country. Also, at the same time, at Con- stantinople.	Lasted, at Leghorn, the time of chanting a <i>credo</i> (!). It appeared to come from the coast. Slight shocks from this up to the 17th, when there was another rather violent, at the same hour.	At Constantinople the sea rushed in so vio- lently that it threw 136 ships up on the strand.	Chimneys were thrown down. Accompanied by a noise like that of a carriage rolling rapidly along.	"Notizia estratta da carte mano- scritte del dott. Vivoli"; Huot, Cours de Géol.; v. Hoff.
— May 31.	In La Puglia, along the Adriatic, to the north- east of the region shaken in 1626.	Many and violent shocks.	.....	Viesti, Rodi, Cagnano, Pieschici, S. Giovanni, and other places at the foot of Mte. Gargano were much injured, and many of their inha- bitants killed.	Vivenzio, 1783, p. 23, and 1788, p. 13.
1647. May 4.	In Denmark .....	.....	.....	.....	Dresdner gel. Anz. 1756. No. 8.
—	Bâle.....	.....	.....	.....	Wieland's Chronik; Brombach's Diarium.
— 13.	In Chili .....	.....	.....	Mountains were in part thrown down	Kircher, Mund. subter. lib. ii. c. 12. sec. 1; Molina, Essai sur l'Hist. Natur. du Chili, trad. de l'Italien (Paris 1789), p. 20; Suppl. Encyc. Britan.; Coll. Acad.
—	Island of Santorin, and in the Levantine Ar- chipelago.	.....	.....	.....	Acta Eruditorum, 1688. p. 517.
1648. Nov. 23.	Yverdun and the Canton of Neufchatel.	Several shocks.....	.....	Accompanied by high wind. The following winter was very wet.	Terra tremens; Bertrand; Coll Acad.

1.	2.	3.	4.	5.	6.
1648.	Zeng in Dalmatia .....	.....	.....	Threw down a portion of the town walls. Followed by very high wind.	Terra tremens.
—	Luçon, one of the Philippine Isles.	.....	.....	.....	v. Hoff.
1649. Beginning of the year.	Messina .....	.....	Almost all the vessels in the port were much injured by being dashed against one another.	.....	Huot, <i>loc. cit.</i> ; Dresdner gelehrte Anz. <i>loc. cit.</i> ; v. Hoff.
— Mar. 4. A little after midnight.	Bergen in Norway	Violent.....	.....	.....	Edwardsen's Hist. of Bergen.
— Nov.	At Naples .....	.....	.....	.....	Terra tremens.
—	Rieti in the States of the Church.	.....	.....	.....	Ditto.
—	Island of Santorin in the Archipelago.	Several violent shocks	.....	.....	Expédit. Scientif. en Morée, part. Géol. p. 272; L'Abbé L., Hist. de Vénise, t. xi. p. 422; Raspe de novis insulis, pp. 29 and 47.
1650. Jan. 10.	Canton of Berne, Neuchâtel, and as far as Morges in the basin of the Rhone.	.....	.....	.....	Bertrand; Scheuchzer; Coll. Acad.; v. Hoff quotes Merian.
— Feb. 15.	Bâle.....	.....	.....	.....	Ditto.
— Mar. 15.	Ditto .....	.....	.....	.....	Ditto.
— — Be- ginning of the month.	Island of Santorin	Two violent shocks....	.....	A great number of houses injured, and rocks rolled into the sea.	Expéd. Scientif. en Morée, &c. before quoted.
— May 2.	Bâle.....	More shocks .....	.....	.....	Bertrand; Scheuchzer; Coll. Acad.; v. Hoff quotes Merian.
— 6.	Ditto .....	.....	.....	.....	Ditto.
— 7.	Ditto .....	.....	.....	.....	Ditto.
— 16.	Ditto .....	.....	.....	.....	Ditto.
At noon.	.....	.....	.....	.....	.....
— July 11.	Ditto .....	.....	.....	.....	Ditto.
4 A.M.	.....	.....	.....	.....	.....
— 26.	Ditto	Several shocks.....	.....	.....	Ditto.
— Sept. 10.	Berne and the shores of the lake of Geneva, Lau-	Very violent .....	.....	.....	Ditto.
				Preceded, the day before, by a furious tempest, which did great damage.	

12. Bâle.....	.....	.....	.....	.....	Ditto.
16. Ditto .....	.....	.....	.....	.....	Ditto.
19. Ditto .....	.....	.....	.....	.....	Ditto.
24. Island of Santorin. Also felt in Candia. to Oct. 9.	Numerous and violent shocks, increasing in intensity until the 27th and 29th, when the most violent oc- curred.	Accompanied by a sub- marine eruption a little to the west of the island, which threw up a large bank of sand, not quite reaching to the level of the water. The vessels in the port of Can- dia were dashed against one another.	Accompanied by very loud subterranean noises like bellowing.	.....	Expéd. Scientif. en Morée, &c. be- fore quoted.
Oct. 9. Bâle.....	Slight shocks .....	.....	.....	.....	Bertrand; Scheuchzer; Coll. Acad.; Merian.
10. Ditto	Ditto .....	.....	.....	.....	Ditto.
13. Ditto	Ditto .....	.....	.....	.....	Ditto.
16. Ditto	Ditto .....	.....	.....	.....	Ditto.
18. Ditto	Ditto .....	.....	.....	.....	Ditto.
20. Ditto	Ditto .....	.....	.....	.....	Ditto.
Nov. 6. Ditto, and throughout the Canton.	Ditto .....	.....	.....	.....	Ditto.
9. Ditto	Ditto .....	.....	.....	.....	Ditto.
10. Ditto	Ditto .....	.....	.....	.....	Ditto.
13. Ditto	Ditto .....	.....	.....	.....	Ditto.
16. Ditto	Ditto .....	.....	.....	.....	Ditto.
20. Ditto	Ditto .....	.....	.....	.....	Ditto.
.....	Experienced eighteen earthquakes during the year.	.....	The year was very rainy .....	.....	Ditto.
1651. Jan. 8. Bâle.....	Several shocks .....	.....	.....	.....	Wieland and Brombach.
18. Ditto	Ditto .....	.....	.....	.....	Ditto.
Feb. 12. Ditto .....	.....	.....	.....	.....	Ditto.
At and around Etna ...	Violent shocks .....	.....	Accompanied by an eruption of the volcano ...	.....	Ferrara, Descrizione, &c. p. 100.
June 8. In Engadine, in the Grisons.	Several shocks .....	.....	.....	.....	Kefenstein, Zeitung für Geognosie, &c. S. 297.

1.	2.	3.	4.	5.	6.
1651. June 25.	In Engadine, in the Grisons.	Several shocks			Keferstein, Zeitung für Geognosie, &c. S. 297.
— Aug. 3.	Ditto	Ditto			Ditto.
— Oct. 29.	Geneva.	Ditto			Ditto.
— Dec. 7.	Ditto	Ditto			Spon, Hist. de Genève, t. i. p. 512; Bertrand; Coll. Acad.
Between 4 and 5 P.M.					
— 1652. Feb. 4.	Chili and Peru				Dread. gel. Anz. l. c.; Terra tremens.
— Aug. 1.	In the canton of Zurich, Bâle and Schaffhausen.	Very violent			Bertrand; Scheuchzer; Coll. Acad.; Ephém. de Manheim, 1783, p. 685.
— Dec. 10.	Bâle			Merian considers this account as doubtful	Merian.
—	Canton of Neuchâtel			Followed by a great abundance of snow	Bertrand; Coll. Acad.
—	Canton of Berne	Several shocks during the year.			Bertrand.
—	Sciaccia in Sicily	Shocks lasting for two weeks.			Ferrara, Campi flegrei.
—	Island of Palma (18 leagues from Teneriffe) and all through the Canaries.			Followed by a volcanic eruption in the island of Palma. [There was also a similar phenomenon this year in the island St. Michel, Azores.] The Coll. Acad. gives the date 1655.	Langlois, Dict. de Géogr. t. i. p. 60; Prévost, Hist. gén. des Voyages, t. ii. p. 243; Malte Brun.
— 1653. Jan. 9.	Frankfort on the Maine.				Lerner's Chronik; Kriegk.
— 14.	Bâle	A violent trembling.			Bertrand; Wieland; Schorer, Discours von den Erdbewegungen.
— Ab' midnight.					Wieland's Chronik.
— Aug. 23.	Ditto			Did great damage to buildings	Dreadn. gel. Anz. loc. cit.
— Sept. 27.	Cesena and Faenza in Italy.	Shocks lasting for several days.			
—	Smyrna	Lasted two days		2000 or 3000 people killed	Ditto, Huot, loc. cit.
1654. Mar. 17.	Canton of Glaris, and different other parts of Switzerland.	In the canton of Glaris fifteen shocks were felt.		Frequent tempests this year and the following.	Bertrand; Scheuchzer; Coll. Acad.
— May 22.	Smyrna and many other places in Asia Minor.				v. Hoff.
— July 8.	Vienna				Ditto.
— 23.	Terra di Lavoro, kingdom of Naples. In a line from the south to the north, a little east; from	Extremely violent. The shocks continued until the 12th August.		Many villages were ruined, and numbers of people lost their lives.	Bertrand; Coll. Acad.; Vivenzio; Terra tremens; Dresden gel. Anz. loc. cit.

1654.	Laybach in Carinthia ...	.....	.....	.....	.....	Collection Académique.
1655. End of March.	Strasburg. Also in Würtemberg.	.....	.....	.....	.....	Terra tremens; Dresd. gel. Anz. loc. cit.
July 3	Frankfort on the Maine.	.....	.....	.....	Injured the city very much. The Dresden. gel. Anz. gives the date 1656.	Lerner's Chronik; Kriegk.
Nov. 13	Lima in Peru .....	.....	.....	.....	.....	Ullos in Hist. gén. des Voyages, t. xx. p. 31.
1656. Feb. 23. At night.	Bâle. Also felt at Neufchatel and other parts of Switzerland.	Three shocks .....	.....	.....	.....	Terra tremens; Bertrand; Wieland's Chronik; Scheuchzer; Coll. Acad.
May 16. Between 3 and 4 A.M.	Bâle.....	One shock .....	.....	.....	.....	Ditto.
Aug. ...	Ditto	Ditto .....	.....	During cold and wet weather, which soon after became warm.	Ditto.	
.....	In Syria .....	.....	.....	Overthrew Tripolis. Keferstein places this event in February, the Dresd. gel. Anz. at the end of the year.	Huot, loc. cit.; v. Hoff; Keferstein; Dresd. gel. Anz. loc. cit.	
.....	District of San Salvador in Mexico.	Disastrous .....	.....	.....	Ennery et Hirth, loc. cit.	
1657. Jan. 29.	Naples and Calabria ...	Lasted but a short time.	.....	200 houses were ruined, and several thousand people killed, according to Huot, who, however, does not give the date of day or month. Threw down some buildings. Accompanied by a subterranean noise like thunder.	Dresdn. gel. Anz. loc. cit.; Huot, loc. cit.	
Feb. 15. 3 P.M.	St. Maure, not far from Tours (Indreet Loire), and the environs for 6 miles round.	.....	.....	.....	Ditto; Theatrum Europæum. cont. p. 1093.	
Mar. 15.	St. Jago in Chili	Very violent .....	.....	.....	Coll. Acad.; v. Hoff.	
April 24. 11 ^a 45 ^m A.M.	In southern Norway; especially at Christiania. Extended from Osterdal to Bohus in the direction N. to S. 40 Norwegian miles, and from the Swedish frontier to Cape Lindesnäs in the direction E. to W.	Violent.....	.....	Accompanied by a noise like thunder. The houses trembled, and articles of furniture were shaken from their places.	The Geologica Norvegica of Michel Pederson Escholt; Phil. Trans. vol. ii. p. 210.	
— 25. Between 3 and 4 A.M.	Ditto	Less violent than the last.	.....	Followed, twenty-four hours after, by a violent whirlwind at Christiania.	Ditto.	
July 8.	Parish of Bickly (Beccles?) in England.	.....	.....	Preceded by a noise like a clap of thunder, the sky being quite serene at the time.	Collection Académique.	

1.	2.	3.	4.	5.	6.
1657. Aug. 9. Bâle.....					Communication of M. Ch. Martins to M. Perrey.
1658. Feb. 18. Malta	Southern part of Iceland.....	Shocks which were repeated up to the 13th March.			Voyage en Islande, p. 313; v. Hoff.
— April 4. Messina		One shock			Terra tremens; Dresd. gel. Anz. <i>loc. cit.</i> ; Keferstein; v. Hoff.
—	Island of Cephalonia ...	Violent.....		Two places (names not mentioned) in the island were completely ruined. According to Keferstein this event took place on the same day with the earthquake at Messina.	Ditto; Theatrum Europæum, t. viii. p. 1017.
—	New England	Ditto			Phil. Trans. vol. l. p. 9.
—	Concepcion in Chili				Theatrum Europæum, t. viii. p. 1018.
1659. Nov. 5. At night.	In Calabria, extending from Pizzo to Mileto, on the west of the Apennines, in the centre of the district shaken in 1638.	Very violent		More than thirty villages are mentioned as having been more or less ruined. Catanzaro was the only place injured not lying to the west of the Apennines.	Vincenzo d'Amato, Mem. Ist. di Catanzaro; Annales Mundi, t. vii. p. 538; Labbe, t. v. p. 905; Coll. Acad.
—	Constantinople	Violent.....		Buildings were thrown down.....	Nani, Hist. di Vinegia, t. ii. p. 493.
1660. Jan. 31. — June 9.	New England	Ditto			Phil. Trans. vol. l. p. 9.
—	In Spain and the coast of France on the Atlantic side.	Several shocks.....		Possibly only the same with the next	v. Hoff.
— — 21. 4 A.M.	At both sides of the Pyrenees, through the whole of the country from Bordeaux to Narbonne on the French side, and at St. Sebastian, &c. on the Spanish.	Violent.....		Near Bilgorre a mountain sank, leaving a lake in its place, and a hot spring became suddenly cold.	Annales Mundi, t. vii. p. 543; Mém. de Chronol. t. ii. p. 919; Labbe, t. v. p. 906; Coll. Acad.; Kircher; Palassou, p. 262; Dresd. gel. Anz. <i>loc. cit.</i>
— Oct.....	Island of Rhodes.....				Dresd. gel. Anz. <i>loc. cit.</i>
— Nov. 1 to Dec. 5.	Neufchatel	Six shocks during the time mentioned.			Bertrand; Coll. Acad.
— Nov. 30. Between 9 and 10 A.M.	Tyrnau in Hungary				Dresd. gel. Anz. 1756. No. 11.

1661. Jan. 8 or 9. Between 10 and 11 P.M.	Throughout the Canton of Glaris.			Did some damage. Scheuchzer gives as date January 9 at 11 P.M.	Bertrand; Scheuchzer; Coll. Acad.
— 15.	Bâle				Communication of M. Ch. Martins to M. Perrey Collection Académique.
— 17. 6th hour.	Duchy of Milan				Bertrand; Coll. Acad. Collection Académique.
— 25.	Neufchatel	Slight shocks		Threw down several buildings at the capital Tadjovan and part of the fortifications of Fort Ze-land. This island is said to be subject to earthquakes.	
— ...	Island of Formosa	The shocks lasted six weeks.			Dresdn. gel. Anz. loc. cit.
— Feb. 24.	Ravenna and twenty-four places adjacent.				Terra tremens; Coll. Acad.
— Mar. 22. 20 ^h 56 ^m .	Central Italy; principally in Modena, Tuscany, and the States of the Church.			Modena, Florence, Faenza, Forli, and twenty other places are mentioned as having suffered considerably by this earthquake. At Cassiano and Castro two clefts opened in the earth, from which there came forth a smell of sulphur. Followed the day after by thunder, and hail of a large size.	
— April 22.	At Venice. Also felt in the Romagna.	The direction of the vibrations at Venice was from E. to W., or according to others, from N.E. to S.W.			Sansovino, loc. cit., p. 85 and 753; Coll. Acad.
— Dec. 3.	Bâle				Communication of M. Ch. Martins to M. Perrey.
— 14.	Ditto				Ditto.
— 24.	Ditto				Ditto.
— 27.	Ditto				Ditto.
— ...	In Spain				v. Hoff.
— ...	England generally				Gentleman's Magazine for 1750, p. 56.
— ...	Island of Angle near Malta.				Dresdn. gel. Anz. loc. cit.
1662. Jan. 26. 6 P.M.	New England	A violent shock, followed by two others during the night and following morning.		The houses were shaken, and chimneys thrown down.	Phil. Trans. vol. 1. p. 9.
— Sept. ...	Rome			Followed by a thunder-storm	Dresdn. gel. Anz. loc. cit.
— Nov. 6.	In Calabria			Threw down several buildings	Fiore, loc. cit. p. 289.

1.	2.	3.	4.	5.	6.
1662	Island of Candia .....	.....	.....	.....	Dresdn. gel. Anz. <i>loc. cit.</i> ; Huot, <i>loc. cit.</i>
.....	Province of Oomi in Japan. ....	.....	.....	At the river Kazira a mountain sank entirely into the ground so as to leave no trace of elevation behind.	Kämpfer, v. Dohm, B. i. S. 190 and 241; Montanus, Gesellschaft.
1663.	In New England.....	.....	.....	.....	Phil. Trans. vol. l. p. 9.
Jan. 5.	In the Canton of Berne, on the side of Aigle.	Slight .....	.....	.....	Bertrand; Coll. Acad.
(or, according to others, Feb. 5).	A district of 400 leagues in circumference in Canada.	Very violent. The shocks recurred until the following July.	The Ice of five or six feet thick was broken up.	Tabussac, Quebec, Sillery, &c. were injured by the shocks, which were accompanied by loud noise, and various atmospheric phenomena. For copious details see Perrey's memoir on earthquakes in the United States and Canada.	Terra tremens; Coll. Acad.; Macgregor's Travels in America, &c. &c.
— June 10.	Canton of Berne, on the side of Aigle.	More shocks .....	.....	.....	Bertrand; Coll. Acad.
— Sept. 10.	All the Alps of the canton of Glaris. ....	.....	.....	Accompanied by a subterranean murmuring noise, which appeared to frighten the cattle.	Ditto; Scheuchzer.
— — 13.	Ditto	Several more shocks .....	.....	Ditto	Ditto.
—	The southern side of Iceland, near Krisewik. ....	.....	.....	At the place mentioned there was a high mountain, at whose foot was a lake of great depth. The waters of the lake were completely swallowed up by this earthquake.	Collection Académique.
1664. Feb. 15.	Nice and Marseilles .....	.....	.....	In his memoirs on the earthquakes of the Italic peninsula and of France, Belgium, and Holland, M. Perrey gives the date 1664 for this event, but in that on the earthquakes of the basin of the Rhone he places it in 1663.	Statistique des Bouches-du-Rhône (communication of M. Aug. Bravais to M. Perrey).
—	Tabriz in Persia, and the country round.	Very violent .....	.....	Did great damage in many places.....	Hadschi Chalifa.
—	Island of Zante	A rather violent shock .....	.....	.....	Montgomery Martin, Hist. of the British Colonies, vol. v. p. 431.
—	In the East Indies, at seven days' journey from Ducca.	The shocks recurred for thirty-two days. ....	.....	.....	Collection Académique.
1665. Jan.	In the island of Candia. ....	.....	.....	Threw down many buildings, and killed several people.	Girolamo Brusoni, Hist. d'Italia, p. 791; Brewer, Historica, sive Hist. Univ. t. x. p. 123.

1665. Feb. 24. In the environs of Ta- dousaque and La Malbaye in Canada.	.....	.....	.....	.....	Relation de ce qui s'est passé de plus remarquables aux missions des Pères de la Compagnie de Jésus en la Nouvelle France en 1664 et 1665. Par Jérôme Lallemant, p. 115, et suiv. Bertrand; Coll. Acad.; Scheuchzer.
— March 1. The Alps of the Canton of Glaris. — In the kingdom of Naples.	.....	.....	.....	.....	Terra tremens. Bertrand; Coll. Acad.
— — 31. Neufchatel and the neighbourhood, princi- pally in the mountains.	.....	.....	.....	At Nichino Casale near Aversa, about 3 miles from Naples the earth opened, and from a cleft of 350 feet long and 100 feet wide there came forth fire and smoke.	Bertrand; Coll. Acad.
— May ... — Oct. 15. Canada..... 9 P.M.	.....	.....	.....	.....	Ditto. Lallemant, Relation, &c. loc. cit.
— — —, 1668, New England and 1669.	.....	.....	.....	.....	Montanus, Gesandtschaft. Phil. Trans. for 1763, p. 251.
1666. Jan. 18. Oxford, Belekington, Stanton, Coventry, Brill, &c. in England. Also, at the same time, in the district of Ei- senthores, Temeswar, Hungary.	.....	.....	.....	.....	Phil. Trans. vol. 1. p. 9.
— Feb. At Kaminiack in Poland	.....	.....	.....	In Hungary rocks were cleft in pieces. The date of the month is not given for the earthquake at Coventry, but there is little doubt of its being simultaneous with that at the other places. v. Hoff gives the date 1665 for all.	Phil. Trans. vol. xvi. p. 624; Ré- volutions du Globe; Dresdn. gel. Anz. loc. cit.
— April 14. Bologna 7 ^h 58 ^m P.M.	.....	.....	.....	.....	Dresdn. gel. Anz. loc. cit.
— Sept. 1. Arbon on the lake of Constance.	.....	.....	.....	The waters of the lake advanced 25 or 30 feet on the shore, and then retired suddenly.	Collection Académique. Bertrand; Coll. Acad.; Scheuchzer.

1.	2.	3.	4.	5.	6.
1666. Sept. 22.	In Syria, at Aleppo and forty-four other places around.	.....	.....	.....	v. Hoff; Huot, <i>loc. cit.</i> ; Brewer, <i>loc. cit.</i> p. 141.
— Oct. 20.	Eglisau in Switzerland (Canton of Zurich).	Shocks of consider- able violence.	.....	.....	Bertrand; Scheuchzer; Coll. Acad.
— Nov.	In Assyria, at Mensal and the country around.	.....	.....	Five towns and forty-five villages were ruined, and four new mountains were raised.	Dresdn. gel. Anz. <i>loc. cit.</i>
— — — — —	Island of Corfu .....	.....	.....	.....	Ditto.
— — — — —	Oporto in Portugal .....	.....	.....	v. Hoff mentions another earthquake at Oporto in December 1667, without, however, quoting any authority. It is probably confounded with the one here mentioned.	Ditto; Huot, <i>loc. cit.</i>
— Dec. 2.	Eglisau in Switzerland (Canton of Zurich).	More shocks .....	.....	Accompanied by subterranean noise	Bertrand; Scheuchzer; Coll. Acad.
— — — — —	8. Ditto	Ditto .....	.....	Ditto	Ditto.
— — — — —	11. Bâle	One violent shock .....	.....	.....	Ditto.
— — — — —	14. Eglisau in the Canton of Zurich.	Several shocks .....	.....	Accompanied by subterranean noise	Ditto.
— — — — —	In the kingdom of Naples, and Calabria. Basilicata, and Calabria.	Several slight shocks.	.....	.....	Vivenzio, 1783, p. 26; 1788, p. 14.
— — — — —	Java .....	.....	.....	Accompanied by an eruption of one of the vol- canoes of the island.	Raffles's History of Java, vol. ii. p. 236.
— or 1667.	In Arsendschan in Asia Minor.	.....	.....	Possibly this account and those of the 22nd Sept. and Nov. may only relate to one event.	Hadschi Chalifa.
1667. Mar. 5.	In Sicily .....	.....	.....	Followed, two days afterwards, by an eruption of Etna.	Mém. de Chronol. t. ii. p. 920.
— April 6.	Ragusa, and all Dalmatia,	Extremely violent.	At Ragusa, the sea re-	Ragusa was quite ruined, and 5000 persons pe-	Coll. Acad.; Huot, <i>loc. cit.</i> ; Ann.
Between 6	Albania, Venice, and	The shocks continued	tired four times, and	rished. The little island of Mozzo near this	de Chim. et Phys. t. xxx. p. 435;
and 7 A.M.	the Italian coast of the	for eight days. The	submarine explo-	city was greatly injured. The earthquake	Gir. Brusoni, <i>loc. cit.</i> p. 847;
	Adriatic; and as far	first shock, which was	sions were heard.	was attended by a violent wind at Ragusa.	Nani, <i>loc. cit.</i> p. 608; Brewer, <i>loc. cit.</i> pp. 123 and 141; Baglivi, p. 516; Andriasci; Partsch, &c.
— — — — —	as Constantinople and Smyrna.	instantaneous. Di- rection at Ragusa = E. to W.	.....	.....	Collection Académique.
— — — — —	16. Bologna	Several shocks .....	.....	.....	Ditto.
18 ^h 22 ^m.	.....	.....	.....	.....	Ditto.
— — — — —	17. Florence	Three shocks, appa-	.....	.....	Ditto.
5 ^h 30 ^m A.M.	.....	rently from E. to W.	.....	.....	Ditto.
— June 27.	Ancona	Several shocks .....	.....	.....	Ditto.
	.....	.....	.....	.....	Dresdn. gel. Anz. 1756, No. 12.

1667. June 30.	Schaffhausen, Berne, Ditto Zurich, Innsbruck, and Salzburg.	.....	.....	.....	Ditto.
— Nov.	At Venice, more violent at Constantinople, and still more so at Smyrna.	.....	At Smyrna the sea as well as the land was affected.	.....	Collection Académique.
—	At Schamaki	Lasted three months.	.....	Buildings of all kinds were ruined. Mountains disappeared, and the earth opened in many places. The roads were so much injured that the caravans were obliged to adopt new routes. 80,000 persons perished.	Philosoph. Ergotzungen oder deutliche Erklärung der Erdbe- ben, Bremen, 1765; Palassou, <i>loc. cit.</i> p. 380; Jean de Struys, Voyages, Amsterdam, 1681, p. 235.
—	Jamaica	Several shocks .....	.....	Several masses of rock, which had been detached from their places by the earthquake, formed a little hill of 59 feet high.	Langlois, Dict. de Géog. t. i. p. 66; Mém. de Chronol. t. ii. p. 920.
1668. Apr. 20. Between 3 and 4 P.M.	Canton of Glaris .....	.....	.....	Accompanied by loud subterranean noises, and followed by a great vapour or cloud.	Bertrand; Scheuchzer; Coll. Acad.
— — 26.	Bâle .....	.....	.....	.....	Communication of M. Ch. Martins to M. Perrey.
— May ...	At different places in the Ottoman Empire.	.....	.....	Produced great ruins	Terra tremens; v. Hoff.
— July 3 to Sept. 13.	Different parts of Asia Minor.	Repeated shocks for the time mentioned.	.....	At Angora the earth opened on two different days. At Castomme on the Black Sea houses were thrown down. Stammas, Maronoy, Sar- duel, Conia, Cæsarea, and several other places were much injured. (The position of these places appears to be very difficult of determina- tion at the present day.)	Dresdn. gel. Anz. <i>loc. cit.</i>
— July 13.	Martinique .....	.....	.....	.....	Terra tremens; v. Hoff.
— Aug. 17.	Neustadt in Austria .....	.....	.....	Some buildings thrown down	Terra tremens; Dresdn. gel. Anz. <i>loc. cit.</i>
— End of	Ragusa and Cattaro. Also felt in Asia Minor.	.....	.....	.....	Dresdn. gel. Anz. <i>loc. cit.</i>
Oct.	Constantinople	Violent .....	.....	.....	Hadschi Chalifa.
— Nov. ...	Frankfort on the Maine.	Slight .....	.....	.....	Lerner's Chronik; Kriegk, <i>loc. cit.</i>
Dec. 14.	.....	.....	.....	.....	.....
Between noon and 1 P.M.	Sarrebourg in Lorraine. The Antilles	One shock .....	.....	The house belonging to the Jesuits at St. Christo- pher's was thrown down. Perhaps this event is only the same with that on the 13th July.	Collection Académique. Hist. gén. des Voyages, t. xv. p. 456; Gazette de France, Nov. 3, 1668.

	2.	3.	4.	5.	6.
Province of Zantung in China.					Churchill's Voyages, vol. 1. p. 101.
Mar. 8. All the country round Etna.	Many shocks, continuing at intervals for some days.			Followed by one of the most memorable eruptions of Etna, which is described at length by v. Hoff.	Coll. Acad.; Raspe, de novis Insulis, p. 85. Also accounts of this particular eruption by J. Alf. Borelli and Tomaso Tedeschi. Also Ferrara, descrizione, &c. p. 101.
Belgrade	One shock				Kefenstein, <i>loc. cit.</i> p. 299.
Belgrade	Three shocks, of which the first was the most violent.				Dresden. <i>gel. Anz. loc. cit.</i>
Bala					Wieland's Chronik.
Laybach in Carinthia					Collection Académique.
Martinique, Guadeloupe, and St. Christopher's in the West Indies.				Possibly only the earthquake of the year before wrongly reported as to date.	Terra tremens; Dresden. <i>gel. Anz. loc. cit.</i>
an. 22 Halle in Saxony	Several shocks.				Kefenstein, <i>loc. cit.</i> p. 300.
On 4 miles from Pernau in Livonia.					Terra tremens.
Canton of Neuchâtel					
17. Hall and Innsbruck in the Tyrol, and the adjacent country, and as far south as Venice. Towards the north, as far as Willingen, Augsburg, Dillingen, and Nuremberg; and to the west, at the lake of Constance, and the Canton of Glarus.	These widely-extended shocks lasted for several days, and were most violent in and about Hall. Their direction there was from E. to W.			Very probably (allowing for the change of style) the same with the next, v. Hoff, however, gives them as different events.	Bertrand; Collection Académique.
18. In the Canton of Glarus.				At Hall a church and several other buildings were thrown down. The earthquake began with the new moon.	Terra tremens; Bertrand; Coll. Acad.; Dresden. <i>gel. Anz. loc. cit.</i>
Schamaki or Chamakhi	Many shocks during the year, there being sometimes as many as three in one day.			Accompanied by a murmuring noise in the air. The Dresden. <i>gel. Anz.</i> gives the date 17th Sept.	Jean de Struys, Voyages, p. 235.

Feb. 1. Ditto At night.	.....	wards evening it be- came very violent, ceased at night, and recommenced the following day with equal impetuosity. Did not last long .....	.....	Some buildings were thrown down, and people crushed to death. Accompanied by much thunder and lightning, and a vast number of "balls of fire," which fell from the heavens, and terrified the inha- bitants greatly. Did scarcely less damage than the preceding	Ditto, p. 249. Ditto, p. 256.
Mar. 31. Ditto Beginning of the night.	.....	.....	.....	.....	.....
May 16. Ditto	.....	.....	.....	.....	Ditto, p. 261. Collection Académique.
June 19. Bologna 22 ^h 41 ^m.	.....	.....	.....	.....	Jean de Struys, <i>loc. cit.</i> p. 261.
Aug. 18. Schamaki.....	.....	.....	.....	.....	Dresdn. gel. Anz. 1756, No. 14.
Sept.	On the coasts of the En- glish Channel and Ger- man Ocean, at St. Malo, Havre, Calais, Dunkirk, and as far as Antwerp.	.....	.....	.....	.....
Dec. 22. Innspruck	One shock .....	.....	.....	.....	Ditto, No. 13.
.....	In the archbishopric of Cologne.	.....	.....	.....	Brewer, Historica, sive Hist. Univ. t. x. p. 240.
.....	Java.....	.....	.....	.....	Kefersteine, <i>loc. cit.</i> p. 300.
1672. Jan. 9. Seigneurie of Hohensax in the Canton of Zu- rich, and the neigh- bourhood.	Two shocks.....	.....	.....	.....	Bertrand; Scheuchzer; Coll. Acad.
April 14. Rimini; felt less violently at Fano, Pesaro, Ravenna, Ancona, and other places in Italy. Almost in- sensible at Bologna.	.....	.....	.....	.....	Coll. Acad.; Girolamo Brusoni, <i>loc. cit.</i> p. 944; Mercure Hollandais, 1672, p. 79; Vinc. Magnati, p. 229. Dresdn. gel. Anz. <i>loc. cit.</i> No. 13.

1673. May 9. Island of Dominica in the West India.				Ditto.
— 20. Giolo and Ternate in the Moluccas.			Accompanied by an eruption of a volcano at Gammanore in Giolo.	Hist. gén. des Voyages, t. xi, p. 26; Valentyn, t. i. pp. 2, 90, 94, 331. Collection Académique.
— Aug. ... In Khorasan			The towns Metched, Nishapour, and a third, the name of which is not given, were destroyed.	
— In the In China, at Pekin, and also at Songtschu, a place 4 leagues distant.			Others give the date 1673	De Maille, Hist. gén. de la Chine, t. xi. p. 88; Du Halde, t. i. p. 476.
— Italy				Collection Académique.
— In the Canaries			Accompanied by subterranean noise, and showers of fire and stones. (Probably an eruption in some of the islands.)	Michele del Bono, Discorso sull' origine de' terremoti, p. 45.
1674. Beginning of Feb. At Yverdun			Followed, on the 17th, by an eruption of the volcano Wawani in this island.	Dresden. gel. Anz. loc. cit. No. 15.
Dec. 6. Du-Throughout almost all Switzerland, especially violent at Bale, Colmar, the district of Hohen-sax in Zurich, and in the Canton of Glara.			Preceded by an explosive noise in the air, and followed by a vapour spreading itself abroad.	Bertrand; Coll. Acad.
1675. Mar. 26. In Hungary, especially at Erlau.			A short time afterwards, two igneous meteors or globes of fire fell from the heavens.	Wieland's Chronik; Brombach's Diarium; Bertrand; Schencher; Coll. Acad.
— End of March.				
— Some Turkish islands in the Adriatic, to the east of Foenia.				Dresden. gel. Anz. 1756, No. 15.
— July 30. Sienna				Collection Académique.
— 10th hour.				
1677. Nov. 13. Island of Palma in the Canaries. Particularly in the southern part of the island, at the hot springs, about 6 leagues from the capital.			They are said to have done no damage, but to have frightened the inhabitants much, because they happened in summer.	"Diario di un Anonimo contemporaneo." (Communicated by M. Palla to M. Perrey.)
			Followed by a violent volcanic eruption, which did not entirely cease until the 21st January 1678.	v. Humboldt, Voyage, t. i. p. 177; v. Buch, Canar. Ins. p. 296, quotes Viera and a manuscript account preserved at Tenerife.

2.	3.	4.	5.	6.
Port Royal in Jamaica				Hist. gén. des Voyages, t. ii. p. 248.
Wolverhampton in England.			Possibly only the same with the event at the same place the following year.	Coll. Acad.; Révolutions du Globe; Plott's History of Staffordshire, p. 142.
Jan. 5. Hanbury on the borders of Derbyshire.	Supposed direction from E to W.			Ditto.
In Staffordshire, especially at Wittenhall near Wolverhampton.	A single shock, which lasted but a short time, and was in the direction S. to N.		Preceded by subterranean noise	
Mar. 24. Sienna.	Rather violent.		Did so damage	Diario, &c. (Communication of M. Filla to M. Perrey).
Apr. 22. At Blois.			The principal church sank considerably into the earth during this earthquake.	gel. Anz. loc. cit. No. 15.
In the district of Zabagh in Caramania.	Violent			Ditto.
June 17. Santa Fé to the north of Lima in Peru.		The sea receded, and after 24 hours (?) returned with destructive violence.		Hist. gén. des Voyages, t. xx. p. 31; v. Humboldt, Voyage, t. i. p. 317.
July. In the Pyrenees			A high mountain sank into the earth, and its place was occupied by a lake.	
Sept. 2. Avignon, Arles and Aix.	Three shocks		Did so damage	Collection Académique.
Oct. 20. In England, at the same places as on the 5th January.			Preceded by a loud noise like prolonged thunder.	Ditto.
Nov. 14. Ditto, especially at Breton.	The shocks recurred three times before 2 A.M. the next morning.			
— 15. Ditto	Less violent than the last.		Ditto	Ditto; Plott's History of Staffordshire.
Jan. 25. In the Canton of Olaria.	Several shocks		Ditto	Ditto.
— 26. A.M.			A subterranean rumbling noise was heard before, during, and after the shocks.	
Mar. 4. In Mexico. (Lat. 13° 32' N.)	A remarkable earthquake.			v. Humboldt, loc. cit. t. ii. p. 297.

1679. Mar. 14.	Bâle.....	One shock			Mosques, houses, and buildings of every kind were crumbled down by this violent earthquake. It appears to have been accompanied by alight volcanic eruption in some places, as it is said that flames and smoke issued from the ground. v. Hoff gives the date 1680.	Wieland's Chronik; Suppl. to Brombach's Diarium.
— June 4. (N.S.) 7 P.M.	The fort of Erivan, and all the country around, to the Ararat chain.	The shocks were most violent for nine days, and continued more or less until October, or, according to others, for a whole year.				Chakathouno, Description of Edebmiasdin.
— Sept.	At Malaga	One shock			Did no damage	Kefertein.
— Dec. 12. 2nd hour of the night. 1680. Jan. 4. 7 A.M.	In the neighbourhood of El-Tito in Calabria. Chedsey in Somersetshire, and the country for some miles round.	Violent				Fiore, loc. cit. p. 289.
— July 24.	Many places in Switzerland, especially at Yverdun, Orbes, Bâle, and Neufchatel.	Many shocks			The air was very calm beforehand, but the shock was accompanied by a noise like a sudden gust of wind. The Gentleman's Magazine does not mention the day. At Orbes followed by a rumbling noise which lasted some minutes, and by storms of thunder, hail, and rain, which produced great inundations, especially in the Pays de Vaud.	A pamphlet called The Theory and History of Earthquakes, p. 17; Gentleman's Magazine for 1750, p. 56. Bertrand; Scheuchzer; Coll. Acad.; Wieland's Chronik.
— Aug. ...	In Spain; especially destructive at Malaga.					Dresdn. gel. Anz. loc. cit.
— Oct. 9. (At Madrid, at 7 A.M.)	Throughout the whole of Spain, principally in the kingdom of Granada.	Several shocks.....			At Madrid the shocks were slight, but at Malaga many houses were thrown down, and clefts opened in the earth, from which torrents of water came forth. Loud subterranean noises were also heard.	Coll. Acad.; Histoire d'Espagne (anonymous), t. viii. p. 249.
— Dec. 11.	Bâle	One shock				Wieland's Chronik; Communication of M. Ch. Martins to M. Perrey. Collection Académique.
— — —	In Italy					Mém. de Chronol. t. ii. p. 920; Coll. Acad.
— — —	Poland					
— — —	Island of Celebes				Accompanied by an eruption of the volcano of Kemas in this island.	Phil. Trans. vol. v. p. 19. No. 7; Valentyn, t. i. pp. 2 and 64. Dresdn. gel. Anz. loc. cit.
1681. Jan. 10 to 12.	Island of Candia	Shocks during the three days mentioned.				
— — — 27. Between 10 and 11 P.M.	Several places in Switzerland, especially in the Canton of Glaris. Also felt at Bâle and Neufchatel.	Several shocks.....			In various places in the Canton of Appenzel the tiles fell from the roofs. The weather was extremely cold.	Bertrand; Scheuchzer; Coll. Acad.

1682. Aug. 12 to 22.	Vesuvius and the coun- try round.	.....	.....	.....	.....	.....	Attended by an eruption	Maria della Torre, <i>loc. cit.</i> p. 66; N. M. Messina di Molfetta, Rela- zione dell' incendio, &c., Napoli. Dresdn. gel. Anz. <i>loc. cit.</i>
1683. April 25. Between 8 and 9 P.M.	Wismar on the Baltic Sea.	.....	.....	.....	.....	.....	.....	Gazette de France, 16 Oct. 1683.
— Aug. 23.	In Basilicata, kingdom of Naples.	Two great earth- quakes.	.....	.....	.....	.....	.....	.....
— Sept. 28. (N.S.). 7 A.M.	Oxford and the neigh- bourhood. Also felt at the same hour at Bur- ford, Watlington, Brill, and other places in Berkshire; the noise extended to Dourton in Buckinghamshire, though the shock was there inappreciable. The earthquake ap- pears to have extend- ed as far as Burford on the north, Long Hanborough on the north-west, Brampton on the west, Abingdon on the south, and the Thames on the east; a circuit of about 70 miles.	Another shock is men- tioned, on the same day, as having been felt at 4 A.M.; but this does not seem to be at all certain. The shock lasted six seconds, and con- sisted of alternate vibrations, succeed- ing one another more and more quickly.	A man who was fish- ing in the Cher- well, at Oxford, per- ceived the boat to tremble under him, and the little fish showed signs of alarm.	Accompanied by a low noise like prolonged thunder. The weather had been very wet up to the 20th, when it became fine until the evening of the 27th, when it was very cold, and even frosty though calm and serene. The barometer was higher than it had been for three years. The <i>ignis fatuus</i> had been often seen some days before the earthquake. The most violent effects mentioned were the throwing down a tin vessel, and setting in mo- tion a bed upon castors.	Phil. Trans. t. ii. p. 208. (edit. of 1745) t. xlv. p. 624; Coll. Acad.	.....	.....	.....
— Oct. 9. 11 P.M.	Oxford, and further north as far as Derbyshire, and the country where the coal-mines are (Staffordshire?).	Felt throughout at the same time. Very feeble at Oxford, but violent farther north.	.....	.....	.....	.....	.....	Ditto.
— Nov. 27.	Bâle .....	.....	.....	.....	.....	.....	.....	.....
—	Erivan, and on the frontiers of Persia and Turkey.	.....	.....	.....	.....	.....	.....	Wieland's Chronik. Ziehen, p. 13.
—	The island of Amboyna, and also the island Ceroewa, 40 miles off.	Violent shocks, last- ing for several weeks.	.....	.....	.....	.....	.....	Valentyn's Beschreibung v. Ostin- dien, B. iii. S. 17.

1.	2.	3.	4.	5.	6.
Feb. 26. "Feb. 8 9 p.m.	Different parts of Switzerland, especially in the Haut-Valais, and, perhaps, at Lansanne and Bâle. In Lorraine, Lunovain, and Poitou. Laybach in Carinthia Surate (Surat?) in Further India.	One shock Several shocks Laybach in Carinthia Surate (Surat?) in Further India.		Some houses were thrown down v. Hoff. Followed by very severe cold. Bertrand and the Collection Académique mention an earthquake in Switzerland as having happened on this day at between 8 and 9 p.m. It is in all probability the same with that of the year before.	Bertrand; Scheuchzer; Coll. Acad. v. Hoff. Collection Académique. Ditto. Wieland's Chronik. Ditto. Vivensio, 1793, p. 27; 1798, p. 14.
— 28. Ditto April 23. "Apr. 23. 9 p.m.	La Cava, Salerno. S. Se- verino, Vietri, and other adjacent places. Canton of Glaris	A violent shock One very violent shock. According to Scheuchzer, preceded by others for some days. One shock		The atmosphere was quite calm	Bertrand; Scheuchzer; Coll. Acad.
Sept. 9. Jan. 1.	Smyna Linköping in Sweden	One shock		Felt by the traveller Dumont	Collection Académique. Dread. gel. Anz. loc. cit.; Keferstein. Dread. gel. Anz. loc. cit.
Sept. "Sept. "Sept.	Palermo and the country for 40 miles round. Laybach in Carinthia Island of Ternate	More very sensible shocks. A slight shock		Followed by a vast shower of ashes cast forth from a volcano on the island.	Collection Académique. Hist. gén. des Voyages, t. ii. p. 4; Phil. Trans. No. 216, p. 42. Bertrand; Scheuchzer; Coll. Acad.
Mar. 5. "Mar. "Mar.	Canton of Glaris At Naples Alexandria in Egypt	Shocks which recurred for ten to twelve days.		Most of the houses and churches thrown down. The inhabitants took shelter under tents in the open country.	Baglivi, p. 538. Dread. gel. Anz. loc. cit. Lettres hist. nov. 1694, p. 488.
April 23. "Apr. 23. 9 p.m.	Naples	Shocks which recurred for ten to twelve days.			

1687. April 25. Midnight.	Naples, and all the coast of Amalfi; especially at Pasitano.	Some other slight shocks were felt during the month.	.....	Possibly only the same with the last	Vivenzio, 1783, p. 27; 1788, p. 14.
— — — — —	The town of Machat on the borders of Persia and India.	.....	.....	The town was ruined	Dread. gel. Anz. <i>loc. cit.</i>
— May 19.	In Zealand .....	.....	.....	.....	Ditto.
— Sept.	In Calabria .....	.....	.....	At Trepæ some houses were thrown down	Vivenzio, <i>loc. cit.</i>
— Oct. 20. 4 A.M.	Lima, Callao, and an immense district along the sea coast of Peru. Also felt on board a vessel 150 hours distant from the coast.	Extremely violent ..	The sea retired, and then came back upon the coast with great violence.	The town and harbour of Callao were quite destroyed by the sea. <i>Tradition</i> also says that wheat never flourished since on the coast visited by this earthquake.	Hist. gén. des Voyages, t. xx. p. 31, quoting Ulloa; Phil. Trans. for 1694, p. 78, &c.
— Dec. 18.	Smyrna	Slight .....	.....	.....	Hist. de l'Acad. des Sciences, t. ii. p. 37; Coll. Acad.
1688. Jan.	Province of Basilicata in the kingdom of Naples.	Violent shocks for three hours.	.....	Pisticcio was ruined, and 2000 of its inhabitants killed.	Dresdn. gel. Anz. <i>loc. cit.</i> ; Huot.
— March 1. (N.S.)	Island of Jamaica	Three shocks in 1 minute. Felt through the whole island at the same time.	The ships in the harbour at Port Royal were much injured. A ship, also, at sea to the east of the island was greatly damaged by a hurricane.	Accompanied by a loud subterranean noise. The earth appeared to rise in waves like the sea, <i>apparently constantly advancing towards the North</i> . All the houses were much injured.	Coll. Acad.; Phil. Trans. vol. li. p. v. 572; v. Humboldt, Voyage, t. ii. p. 22.
— April 1 to 11.	Venice	Several shocks .....	.....	.....	Keferstein.
— May 1. 10 A.M.	Genoa and a great part of the Genoese territory.	Ditto .....	.....	.....	Hist. de Gênes. (anonymous), t. iii. p. 428.
— June 5 to 8.	At Naples and many other places along the Apennines as far as Matese to the north, and Mirabella and Benevento to the south. Also felt at the same time at some places in Romagna, at Venice, and even at Smyrna.	Many shocks. The first, which were very violent, occurred on the 5th at 21 ^h , and lasted a <i>Misere</i> . They were very great at Benevento. The shocks did not entirely cease for 2 months.	.....	Chasms opened in the ground in many places ...	Giannone, <i>loc. cit.</i> p. 845; Michele del Bono, <i>loc. cit.</i> ; Coll. Acad.; Vinc. Magnati, p. 237; Vivenzio.

1.	2.	3.	4.	5.	6.
1688. July 10. 11 ^h 45 ^m A.M.	Smyrna	Began by a movement from W. to E., which lasted half a minute. Followed by five or six other shocks before night.	The ships near were much agitated.	A building situated on a little isthmus was thrown down, and the peninsula separated from the mainland by a channel of 100 paces wide. The town was ruined, and caught fire in many places. All the walls running E. and W. were thrown down, while those running N. and S. remained upright. The surface of the earth at the town was lowered by 2 feet. The earth opened in many places. 15,000 or 20,000 persons perished.	Coll. Acad.; Hist. de l'Acad. des Sciences, t. ii. p. 37; Kant, Géog. Fis. (Ital. Trans.) t. iv. p. 338.
— 11 and 12.	Ditto	More shocks .....	.....	.....	Ditto.
— Aug. 11. 8 A.M.	Ditto	Ditto .....	.....	The weather was very cold, and the heavens obscured. New springs were remarked.	Ditto.
— Sept. 10.	The islands of Metellino, Chio, and Satalin, and along the opposite coast of Asia Minor.	.....	.....	At Smyrna a strong smell of sulphur was perceived.	Ditto.
— — — At night.	Constantinople .....	.....	.....	.....	Ditto.
— — — 4 A.M.	Genoa .....	.....	.....	.....	Hist. de Gènes, <i>loc. cit.</i>
— Oct. 10.	Lima, and several other towns both of Peru and Mexico.	.....	.....	.....	v. Humboldt, <i>loc. cit.</i> t. ii. p. 298; Dread. gel. Anz. <i>loc. cit.</i>
—	Etna and the country round.	Shocks for seven days.	.....	.....	Accompanied by loud subterranean noises, and followed by an eruption of Etna.
—	Middle near Ellesmere, — England.	An earthquake .....	.....	.....	An old castle said to have been destroyed. The fact seems doubtful.
1689. Feb. 12.	Mexico .....	.....	.....	.....	p. 84.
— Mar. 14.	Etna and the neighbourhood.	A violent shock .....	.....	.....	v. Humboldt, <i>loc. cit.</i> t. ii. p. 298.
— June ...	Neufchatel and the environs.	Several shocks .....	.....	.....	Ferrara, Descrizione, &c. <i>loc. cit.</i>
— Sept. 21.	In Puglia and the Terra di Bari.	Apparent direction = S. to N.	.....	.....	Bertrand; Coll. Acad.
— Oct. 9.	Genoa .....	.....	.....	Barletta, Andria, and some other places were ruined.	Vivenzio, 1783, p. 29; 1788, p. 15.
— Dec. 11.	Innsbruck and Augsburg.	Violent shocks .....	.....	.....	Dread. gel. Anz. <i>loc. cit.</i>
— — — 21.	Ditto	Ditto .....	.....	.....	Ditto; Coll. Acad.
					Ditto.

1689	Belgrade	Violent.....	.....	.....	.....	Hadschi Chalifa. Dread. gel. Anz. <i>loc. cit.</i> Ditto. Ditto. v. Hoff.
1690. Jan. 13.	Smyrna .....	.....	.....	.....	.....	Dread. gel. Anz. <i>loc. cit.</i> No. 19.
— 15.	Drontheim in Norway .....	.....	.....	.....	.....	Ditto.
— 28.	Kingston in Ireland (?) .....	.....	.....	.....	.....	Ditto.
— Feb. 19	Laybach in Carinthia, and in Bohemia. ....	.....	.....	.....	.....	v. Hoff.
— to 21.	.....	.....	.....	.....	.....	.....
— 26.	The islands of Antigua, Montserrat, Barbadoes, and St. Christopher's. ....	.....	.....	.....	.....	Dread. gel. Anz. <i>loc. cit.</i> No. 19.
— April 10.	Ditto, and at Martinique and St. Lucie. ....	.....	.....	.....	.....	Ditto.
— Oct. 17.	Dublin and Kilkenny in Ireland. ....	.....	.....	.....	.....	Phil. Trans. 1750.
— Dec. 5.	In several places in Switzerland, and in Swabia, Austria, Prus- sia, Thuringia, and in fact almost all Ger- many; also in Poland (the date of the year only, however, being given for this last lo- cality).	Apparent direction = S.W. to N.E. Fol- lowed by another shock at 7 P.M., but slighter. ....	.....	.....	.....	Dread. gel. Anz. <i>loc. cit.</i> ; Höpfner, das erschütterte und bebende Meissen; Lersner's Chronik; Kriegk; Coll. Acad.; Langlois, Dict. de Géogr. t. i. p. 66.
— (N.S.) 3 P.M.	.....	.....	.....	.....	.....	.....
— 18.	Cologne .....	.....	.....	.....	.....	v. Hoff.
— Middle	In England and Scot- land; in Bedford, Sutherland, &c.	Two shocks in Bed- fordshire. ....	.....	.....	.....	Dread. gel. Anz. <i>loc. cit.</i> ; Coll. Acad.
— of the night.	.....	.....	.....	.....	.....	.....
—	Constantinople .....	.....	.....	.....	.....	Hadschi Chalifa.
—	Lima in Peru	Three earthquakes du- ring this year. ....	.....	.....	.....	Coll. Acad.; Ulloa, Voyage au Pérou, t. i. p. 467.
1691. Jan. 1.	Ancona and Rimini.....	Several shocks.....	.....	.....	.....	v. Hoff.
— 4.	Bâle.....	One shock .....	.....	.....	.....	Ditto.
— 26.	Ditto .....	.....	.....	.....	.....	Bertrand; Coll. Acad.; Philibert's Chronik.
6 A.M.	.....	.....	.....	.....	.....	Lersner's Chronik; Coll. Acad.; Miscell. Acad. Nat. Curios. 1690, p. 423.
— Feb. 19,	Carlstadt in Transylva- nia, Laybach in Car- niola, Venice, Bâle, Metz (most violent at the three last places), Sarre-Louis, Mayence, Frankfort, and Hanau.	The first shock was the most violent. Direction = E. to W. (at what place?) .....	.....	.....	.....	.....
— 20, and 21.	.....	.....	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
1691. Sept. 8. 2 P.M.	Deal, Canterbury, Sandwich, and Portsmouth.	Said to last six minutes.			A pamphlet called The Theory and History of Earthquakes, p. 18.
— Oct. 14.	In Japan	Two shocks at Desima or Nangasaki.			Kämpfer, v. Dohm, t. ii. p. 323.
— — 17.	Aquila in Abruzzo	One shock			Kefenstein.
— — 26.	Sienna	A slight trembling			Pirro Gabrielli, Mem. dei Fisiocritici, t. i.
— Nov. 10.	Japan	Several shocks			Kämpfer, v. Dohm, loc. cit.
In the evening, and at night.					
—	The town of Azua in St. Domingo.			The town was ruined	Comptes Rendus de l'Acad. t. xvi. p. 1153.
—	St. Michel in the Azores		After violent earthquakes several little islands were raised above the sea near the coast of St. Michel.		v. Buch, loc. cit. p. 367.
1692. June 7.	Jamaica	Extremely violent shocks, which did not entirely cease for two months.	A frigate was wrecked in the port.	The island rose in waves like the sea, and the people believed that it sank a little permanently.	Coll. Acad.; Phil. Trans. vol. li. p. 577; Hist. gén. des Voyages, t. xv. p. 581; Mercure Hist. et Polit. Sept. 1692, p. 344; Montg. Martin, vol. ii. p. 155; Preuss. Staats-Zeitung, 1826, No. 36, p. 147, &c.
Between 11 A.M. and noon.				At Port Royal three-fourths of the houses were thrown down, and 3000 persons perished. A piece of land of about 1000 acres sank into the sea. Louis Gelday, an inhabitant of the island, was caught in one of the fissures of the earth, and thrown out again uninjured by a second shock. In this same month there was an eruption of a volcano at St. Kitt's, continuing several weeks.	
— Sept. 18.	Very widely extended; the centre being probably in Brabant, and the earthquake extending to Paris, Normandy, England, Flanders, Holland, and as far east as Mayence, Frankfort, and the Valais.	Very violent. Lasted two minutes.		Brussels, Antwerp, Spa, Ipswich, Deal, Dover, Sheerness, and other places are mentioned as having experienced these shocks. It was observed that mountains, the coasts of the sea, and the banks of rivers were most affected. There was no wind at the time of the earthquake. Many persons felt their heads giddy after the shock. The Lettres Historiques give the date September 25.	Bertrand; Coll. Acad.; Phil. Trans. vol. xlv. p. 624; Vivenzio; Lerner's Chronik; Kriegk, &c.; A History of Ipswich in the 19th century, by John Glyde, Jun., Ipswich, 1850, p. 13.
— — 20 or 21. Between 8 and 9 A.M.	Ditto	Less violent than the last.			Ditto.

1692. Oct. 15. Schaffhausen .....	.....	.....	.....	.....	Keferstein.
— 28. Frankfort on the Maine. ....	.....	.....	.....	.....	Ditto.
— 30. Liège .....	.....	.....	.....	.....	Ditto.
— .....	.....	.....	.....	.....	Hist. gén. des Voyages quoting Atkins's Travels in Guinea, p. 30.
1693. Jan. 9. Lausanne, Orbes, and Yverdun. ....	.....	.....	.....	.....	Bertrand; Coll. Acad.
— 5 P.M. ....	.....	.....	.....	.....	Ditto; Hamilton's Observations on Mt. Vesuvius, p. 59; Biblioteca Italiana, t. xi. p. 347; Phil. Trans.; Ferrara, &c. &c.
— Feb. 13. In the neighbourhood of Hecla in Iceland. ....	.....	.....	.....	.....	v. Hoff.
— April 28. Between Militello and Noto in Sicily. ....	.....	.....	.....	.....	Coll. Acad. and the other authorities quoted for the 9th January.
— June 4. The island Ceroewa in the Moluccas. ....	.....	.....	.....	.....	Phil. Trans. vol. xix. p. 49; v. Buch; loc. cit. p. 366; v. Hoff.
— July 6. Venice, Padua, Mantua, and Avignon. ....	.....	.....	.....	.....	Authorities just quoted under 9th January.
— End of Catania and the country round. ....	.....	.....	.....	.....	Ditto.
— Sept. Dec. 16 Frankfort on the Maine. ....	.....	.....	.....	.....	Lersner's Chronik; Kriegk.
— (O.S.) 1 P.M. ....	.....	.....	.....	.....	Mercure Hist. et Polit. Mars et Avril, 1693, pp. 332 and 366.
— At the Havanna .....	.....	.....	.....	.....	v. Humboldt, loc. cit. t. v. p. 28; Phil. Trans. 1694, p. 99.
— Jamaica .....	.....	.....	.....	.....	Maria della Torre, loc. cit. p. 66; Coll. Acad.; Mercure Hist. et Polit. Mai, 1694, p. 462. A description of the succeeding eruption by Ant. Balifone.
1694. March 1. The country around Mount Vesuvius. ....	.....	.....	.....	.....
— 9 P.M. ....	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
1691. Sept. 8. 2 P.M.	Deal, Canterbury, Sandwich, and Portsmouth.	Said to last six minutes.			A pamphlet called The Theory and History of Earthquakes, p. 18.
— Oct. 14.	In Japan	Two shocks at Desima or Nangasaki.			Kämpfer, v. Dohm, t. ii. p. 323.
— — 17.	Aquila in Abruzzo	One shock			Kefenstein.
— — 26.	Sienna	A slight trembling			Pirro Gabrielli, Mem. dei Fisiocritici, t. i.
— Nov. 10.	Japan	Several shocks			Kämpfer, v. Dohm, <i>loc. cit.</i>
In the evening, and at night.					
— — —	The town of Azua in St. Domingo.			The town was ruined	Comptes Rendus de l'Acad. t. xvi. p. 1153.
— — —	St. Michel in the Azores		After violent earthquakes several little islands were raised above the sea near the coast of St. Michel.		v. Buch, <i>loc. cit.</i> p. 367.
1692. June 7.	Jamaica	Extremely violent shocks, which did not entirely cease for two months.	A frigate was wrecked in the port.	The island rose in waves like the sea, and the people believed that it sank a little permanently. At Port Royal three-fourths of the houses were thrown down, and 3000 persons perished. A piece of land of about 1000 acres sank into the sea. Louis Gelday, an inhabitant of the island, was caught in one of the fissures of the earth, and thrown out again uninjured by a second shock. In this same month there was an eruption of a volcano at St. Kitt's, continuing several weeks.	Coll. Acad.; Phil. Trans. vol. li. p. 577; Hist. gén. des Voyages, t. xv. p. 581; Mercure Hist. et Polit. Sept. 1692, p. 344; Montg. Martin, vol. ii. p. 155; Preuss. Staats-Zeitung, 1826, No. 36, p. 147, &c.
— Sept. 18.	Very widely extended; the centre being probably in Brabant, and the earthquake extending to Paris, Normandy, England, Flanders, Holland, and as far east as Mayence, Frankfort, and the Valais.	Very violent. Lasted two minutes.		Brussels, Antwerp, Spa, Ipswich, Deal, Dover, Sheerness, and other places are mentioned as having experienced these shocks. It was observed that mountains, the coasts of the sea, and the banks of rivers were most affected. There was no wind at the time of the earthquake. Many persons felt their heads giddy after the shock. The Lettres Historiques give the date September 25.	Bertrand; Coll. Acad.; Phil. Trans. vol. xlv. p. 624; Vivenzio; Lescner's Chronik; Kriegk, &c.; A History of Ipswich in the 19th century, by John Glyde, Jun., Ipswich, 1850, p. 13.
— — — 20 or 21.	Ditto	Less violent than the last.			Ditto.
Between 8 and 9 A.M.					

[illegible]

1.	2.	3.	4.	5.	6.
1691. Sept. 8. 2 P.M.	Deal, Canterbury, Sandwich, and Portsmouth.	Said to last six minutes.			A pamphlet called The Theory and History of Earthquakes, p. 18.
— Oct. 14.	In Japan	Two shocks at Desima or Nangasaki.			Kämpfer, v. Dohm, t. ii. p. 323.
— — 17.	Aquila in Abruzzo	One shock			Kefenstein.
— — 26.	Sienna	A slight trembling			Pirro Gabrielli, Mem. dei Fisiocritici, t. i.
— Nov. 10.	Japan	Several shocks			Kämpfer, v. Dohm, <i>loc. cit.</i>
In the evening, and at night.					
— — —	The town of Azua in St. Domingo.			The town was ruined	Comptes Rendus de l'Acad. t. xvi. p. 1153.
— — —	St. Michel in the Azores		After violent earthquakes several little islands were raised above the sea near the coast of St. Michel.		v. Buch, <i>loc. cit.</i> p. 367.
1692. June 7. Between 11 A.M. and noon.	Jamaica	Extremely violent shocks, which did not entirely cease for two months.	A frigate was wrecked in the port.	The island rose in waves like the sea, and the people believed that it sank a little permanently. At Port Royal three-fourths of the houses were thrown down, and 3000 persons perished. A piece of land of about 1000 acres sank into the sea. Louis Gelday, an inhabitant of the island, was caught in one of the fissures of the earth, and thrown out again uninjured by a second shock. In this same month there was an eruption of a volcano at St. Kitt's, continuing several weeks.	Coll. Acad.; Phil. Trans. vol. li. p. 577; Hist. gén. des Voyages, t. xv. p. 581; Mercure Hist. et Polit. Sept. 1692, p. 344; Montg. Martin, vol. ii. p. 155; Preuss. Staats-Zeitung, 1826, No. 36, p. 147, &c.
— Sept. 18. (N.S.) Between 2 and 3 P.M.	Very widely extended; the centre being probably in Brabant, and the earthquake extending to Paris, Normandy, England, Flanders, Holland, and as far east as Mayence, Frankfort, and the Valais.	Very violent. Lasted two minutes.		Brussels, Antwerp, Spa, Ipswich, Deal, Dover, Sheerness, and other places are mentioned as having experienced these shocks. It was observed that mountains, the coasts of the sea, and the banks of rivers were most affected. There was no wind at the time of the earthquake. Many persons felt their heads giddy after the shock. The Lettres Historiques give the date September 25.	Bertrand; Coll. Acad.; Phil. Trans. vol. xlv. p. 624; Vivenzio; Lerner's Chronik; Kriegk, &c.; A History of Ipswich in the 19th century, by John Glyde, Jun., Ipswich, 1850, p. 13.
— — — or 21. Between 8 and 9 A.M.	Ditto	Less violent than the last.			Ditto.

1692. Oct. 15.	Schaffhausen	.....	.....	.....	Keferstein.
— 28.	Frankfort on the Maine.	.....	.....	.....	Ditto.
— 30.	Liège	.....	.....	.....	Ditto.
—	Ile de Fer in the Atlantic, off the coast of Africa.	.....	.....	A violent volcanic eruption at the same time, which lasted six weeks.	Hist. gén. des Voyages quoting At- kins's Travels in Guinea, p. 30.
1693. Jan. 9.	Lausanne, Orbes, and Yverdun.	.....	.....	At Orbes the marshes filled very high at the time of the earthquake, and the lakes of the valley of Joux were also very high. The weather had been cold, but it now became suddenly warm, with gentle rain, and the ensuing sea- son was an early one.	Bertrand; Coll. Acad.
— 5 P.M.	Sicily and Calabria. Also at Malta, and se- veral places in Swit- zerland, France, Ger- many, Flanders, Hol- land, and England, for a space of 2600 square miles.	.....	Extremely violent shocks. The first lasted two minutes. Direction in Cala- bria = S.W. to N.E. Followed by other shocks on the 10th and 11th.	In Sicily the earth opened in many places. Cata- nia was ruined by the first shock. Forty-nine towns, numerous villages, and 972 churches or convents were ruined in Calabria and Sicily, and 93,000 persons lost their lives. It does not seem certain that the shocks were simultaneous here and in the other parts of Europe men- tioned. There was an eruption of Etna at the same time.	Ditto; Hamilton's Observations on Mt. Vesuvius, p. 59; Biblioteca Italiana, t. xi. p. 347; Phil. Trans.; Ferrara, &c. &c.
— Feb. 13.	In the neighbourhood of Hecla in Iceland.	.....	.....	Also affected the sea near the coast.	v. Hoff.
— April 28.	Between Militello and Noto in Sicily.	.....	Violent.....	.....	Coll. Acad. and the other authorities quoted for the 9th January.
— June 4.	The island Ceroewa in the Moluccas.	.....	.....	Followed by a violent volcanic eruption	Phil. Trans. vol. xix. p. 49; v. Buch; <i>loc. cit.</i> p. 366; v. Hoff.
— July 6.	Venice, Padua, Mantua, and Avignon.	.....	Slight shocks	.....	Authorities just quoted under 9th January.
— End of Catania and the country round.	.....	.....	Many shocks	Moderate damage. The eruption of Etna still continuing.	Ditto.
Sept.	Frankfort on the Maine.	.....	.....	.....	Lersner's Chronik; Kriegk.
(O.S.) 1 P.M.	At the Havanna	.....	.....	More than 1500 houses thrown down	Mercure Hist. et Polit. Mars et Avril, 1693, pp. 332 and 366.
—	Jamaica	.....	Shocks lasting for some months.	.....	v. Humboldt, <i>loc. cit.</i> t. v. p. 28; Phil. Trans. 1694, p. 99.
1694. March 1.	The country around Mount Vesuvius.	.....	One slight shock. Fol- lowed by several others up to the 12th.	On the 12th at 3 o'clock at night (Italian time) a violent eruption of Vesuvius. During the course of this month an eruption of Etna with some earthquake shocks.	Maria della Torre, <i>loc. cit.</i> p. 66; Coll. Acad.; Mercure Hist. et Polit. Mai, 1694, p. 462. A de- scription of the succeeding erup- tion by Ant. Bulifone.

1.	2.	3.	4.	5.	6.
1694. April 4.	All the country about Vesuvius, and at Urbino, Castello, Borgo, San-Sepolcro, Naples, and even some places in Romagna.	Many shocks, continuing for some days.		Some buildings were thrown down. Accompanied by a great eruption of Vesuvius.	Maria della Torre, <i>loc. cit.</i> p. 66; Coll. Acad.; Mercure Hist. et Polit. Mai, 1694, p. 462. A description of the succeeding eruption by Ant. Bulifont.
— July ...	In Sicily and the island of Negropont at the same time.			In Negropont a bastion was thrown down	Mercure Hist. et Polit. 1694, Aug. p. 125; Lettres Hist. 1694, Sept. p. 253.
— Sept. 8. 9 ^h 45 ^m A.M.	In the kingdom of Naples; principally in the Terra di Lavoro, the two Calabrias, and Basilicata; in a line from S.E. to N.W., between the coast of the Tyrrhenian Sea and the south-west spur of the Apennines.	At Naples it lasted the time of repeating a <i>Credo</i> . At Tricarico (Basilicata) and Sacracena (Calab. Cit.) the earthquake recommenced three times. During the course of this month and the following several other slight shocks were felt at Naples and Catania. Followed by other violent shocks after sunrise the following morning, which often recurred for several months. Two shocks		Naples, Sorrento, Castellamare, Vico, Ottajano, Nola, Sta. Maria, Aversa, and Capua were all violently shaken. At Naples the public buildings only were much injured. Etna threw out immense quantities of ashes.	Mercure Hist. et Polit. Oct. et Nov. 1694, pp. 359, 361, and 476; Lettres Hist. Nov. 1694, p. 489; Coll. Acad.
1695. Feb. 24. At night.	In the Venetian territories; especially in the district of Asolano (diocese of Treviso).			It was remarked that the sun even at noon was pale and dull, as if hidden by a mist. The same was observed in 1783. The following winter was extremely cold.	Codice Meteorico di Nicodemo Martellini. Venezia, 1700.
— May 21. 2 P.M.	Island of Banda				Collection Académique.
— June 10. 11 P.M.	Different parts of the States of the Church; especially at Bagno-reale, Bologna, Viterbo, Montefiascone, Celleno, Orvieto, Castiglione, &c.	Preceded by some rather slight shocks. The most violent (especially two of the shocks) were at the hour mentioned.	The lake of Bolsena was raised so as to overflow its shores and produce an inundation for 3 miles round, afterwards retiring, and leaving the shore covered with fish.	It was remarked that the Clitumnus (la Vene), which had lost much of its waters during the earthquake of 441 or 446, now in great measure recovered them.	Kefenstein, <i>loc. cit.</i> ; Coll. Acad.; Mercure Hist. et Polit. 1695, Juil. p. 5; Août, p. 125; Sept. 247; Lettres Hist. 1695, Juil. p. 112; Août, p. 113.

1695. June 11. 3 A.M.	Ditto, and at Rome; and, with less violence, at Frascati, Tivoli, and the neighbourhood.	Almost continuous shocks. The most violent at the times here mentioned.	.....	Did great damage in many places. In some localities the earth opened in chasms.	Ditto.
— — — 7 P.M.	Ditto	Ditto	.....	.....	Ditto.
— — — 2 P.M.	Ditto	Ditto	.....	.....	Ditto.
1696	In Sicily .....	.....	.....	Several towns said to have been ruined. Possibly only the same with some of the earthquakes of the year or two before.	Histoire d'Espagne (anonymous).
—	Falmouth in England .....	.....	.....	.....	Gentleman's Magazine for 1750, p. 56.
1697. Feb. 20. At night.	Various places in the Calabrias. Felt very violently at Naples.	Several shocks .....	.....	Vesuvius was in a state of eruption. The houses at Naples were much shaken.	Mercure Hist. et Polit. 1697, Avril, p. 367.
— Mar. 24. 10 P.M.	Mexico.....	Shocks for two minutes. Followed, the next day, by others.	.....	Acapulco was destroyed; while Pueblo Nuevo was not even injured. The shocks on the following day were accompanied by a loud noise like the firing of cannon.	Hist. gén. des Voyages, t. x. p. 528.
— Pro- bably in March.	Essek in the government of Waradin, Transylvania.	Several shocks.....	.....	Accompanied by thunder and lightning, but without doing any serious injury to buildings, &c.	Mercure Hist. et Polit. 1697, Avril, p. 367.
— Sept. 20, 21, and 23.	Sienna	Seventy-four feeble shocks on the first two days. Many slight shocks from this time until the 19th March of the following year.	.....	Very little damage done.....	Ditto, Nov. p. 587; "Manoscritto presso il cav. Perfetti, citato da Soldani."
— — — 29.	Lima in Peru	A very violent earthquake.	.....	.....	Coll. Acad.; Vivenzio; v. Hoff.
— Oct. 2. Between 8 and 9 P.M.	Venice	Three shocks .....	.....	.....	Mercure Hist. et Polit. loc. cit. p. 587.
1698. June 2 to July 12.	All the country round Vesuvius.	Numerous and violent shocks.	.....	Preceded by a great eruption of Vesuvius	Maria della Torre, loc. cit. p. 67; Ant. Bulifone, Compendio istorico, &c.
— June 19.	The Andes about Quito.	Very violent .....	.....	The summit of the volcano Carguairazo fell in, and from the broken part of the mountain came forth streams of mud and water, which did great damage. The towns Hambato and Llactacunga were ruined by the earthquake.	Bouguer de la figure de la terre, p. 71; v. Humboldt, Atlas Pittoresque, p. 106.

1.	2.	3.	4.	5.	6
1698.	Catania .....	.....	.....	Did great damage. Etna was in eruption at the time.	Mercure Hist. et Polit. Juil. 1698, p. 20.
1699. Jan. 5.	Islands of Java and Sumatra.	Extremely violent. In Java not less than 208 shocks were counted.	.....	Accompanied by an eruption of the volcano Salak in Java. Great changes were produced in the surface of the islands, large landlips taking place, which in many places choked up the course of the rivers, &c.	Phil. Trans. 1700; Hooke's Posthumous Works, p. 487.
—	In Switzerland; on the Rhine and Maine; and at Hamburg.	Several shocks .....	.....	Great numbers of auroræ boreales were observed this year and the year before.	Kefenstein.
— July 14.	Lima in Peru .....	.....	.....	.....	v. Hoff.
— Oct. 27.	Lisbon	Very violent. Lasted, with many intervals, for three days.	.....	.....	Balbi, Essai sur le Royaume de Portug. &c. t. i. p. 102.
—	At Catania and in Malta. Also felt at the same time in France, Germany, and England.	Very violent shocks....	The sea near Catania retired more than 2000 yards from the shore.	Possibly only the same with that of last year ...	Mém. de Chronol. t. ii. p. 922.
1700. Feb. 6.	Sienna in Tuscany .....	.....	.....	.....	Kefenstein.
1701. Mar. 13 to 27.	In the Saxon Erzgebirge, and Voigtland; especially at Schneeberg.	Many shocks during the time mentioned.	.....	.....	Joh. Fr. Seyfart, Allgemeine Geschichte der Erdbeben, p. 94, quotes Ziegler's Schauplatz der Zeit. 1 Fortsetz, S. 1208.
— April 5.	Sienna	Moderate.....	.....	On the 3rd there had been rain, and on the 4th and 5th a good deal of snow.	"Manoscritto presso il cav. Perfetti, citato da Soldani."
— About the 4th hour of the night.	.....	.....	.....	.....	Seyfart, <i>loc. cit.</i>
— Between 11 and 12 P.M.	Schneeberg	A violent trembling....	.....	.....	Ditto.
— to 23.	In the Erzgebirge; especially at Johann Georgenstadt and Plauen.	Daily shocks .....	.....	.....	.....
— Aug. 17. 6 P.M.	In Saxony .....	.....	.....	.....	Collection Académique.

1701. Aug. 19. (O.S.) Between 6 and 7 P.M.	In the Linththal, Canton of Glaris.	Three shocks	.....	Accompanied by a loud noise in the air. From the 19th August of this year until the 30th January, 1702, the Canton of Glaris experienced thirty-seven, or according to others fifty (or even sixty) earthquakes, consisting of more or less shocks, often accompanied by subterranean murmurs, and sometimes loud noise. The list of thirty-seven noticed by Scheuchzer is here given. Probably only the same day as the last, allowing for change of style.	From Bertrand; Scheuchzer; Coll. Acad.
— 30. 9 P.M.	Ditto	.....	.....	Ditto.	Ditto.
— 31. 3 A.M.	Ditto	.....	.....	Ditto.	Ditto.
— Sept. 1. 11 P.M.	Ditto	.....	.....	Ditto.	Ditto.
— 2. 9 A.M.	Ditto	.....	.....	Ditto.	Ditto.
— 4. 8 A.M.	Ditto	Probably two shocks.	.....	The people in church heard the tongue (or lid) of the poor-box at the door strike twice as if struck with a stick.	Ditto.
— 5 P.M.	Ditto	Two shocks, of which one was violent.	.....	Ditto.	Ditto.
— 5. 9 P.M.	Ditto	Violent.....	.....	Ditto.	Ditto.
— Between 11 P.M. and midnight.	Ditto	.....	.....	Ditto.	Ditto.
— 6. 10 P.M.	Ditto	A violent shock	.....	Ditto.	Ditto.
— 7.	At Bettschwanden, and throughout the Linththal, as far as Esch, to the beginning of the Schachenthal.	Very violent	.....	Accompanied by different noises in the air. Bodies on the earth were much moved about.	Ditto.
— 8. 1 A.M.	In the two valleys of the Linththal (Gross- and Klein-thal).	One violent shock	.....	Sufficiently great to rock the people in their beds.	Ditto.
— 10. 8 A.M.	Linththal and the country round.	.....	.....	Ditto.	Ditto.
— 13. (N.S.) 10 A.M.	Ditto	.....	.....	Ditto.	Ditto.

1.	2.	3.	4.	5.	6.
1701. Sept. 18. 4 P.M.	Linththal and the coun- try round.			Accompanied by noise	Bertrand; Scheuchzer; Coll. Acad.
(N.S.) 19. 8 A.M.	Ditto	A violent shock			Ditto.
(Hour not mentioned.)	Ditto (more violent in the Linththal than at Bettschwanden).	The most violent which had been felt.		Those in church heard a noise like the violent grinding of stone, and the building was greatly shaken.	Ditto.
23. (N.S.) A little before 4 P.M.	Ditto	A short shock and then a slight trem- bling.		Accompanied by a hissing or humming noise. The weather however being fine, and the sun shining.	Ditto.
29. (N.S.) 7 P.M.	Ditto (felt in both val- leys).	Slight oscillation, without shocks.			Ditto.
Oct. 23. (N.S.) 6 A.M.	Ditto	One of the feeblest of these earthquakes.		The ground had been covered with snow for five days. This earthquake, though very slight, was remarked by very many people.	Ditto.
26. (N.S.) 8 ⁴⁵ ^m P.M.	Ditto (in both valleys).	Moderate		Felt by many people. There had been a thick mist all day, which cleared away about mid- night, and gave place to a fine starlight night.	Ditto.
Nov. 13. (N.S.) 7 A.M.	Ditto (on both sides of the Linth).	A feeble shock.			Ditto.
Dec. 12. (N.S.) 8 P.M.	Ditto			During clear and cold weather. Two days before it had been very warm.	Ditto.
19. (N.S.) 3 ¹⁵ ^m A.M.	Ditto	One violent shock			Ditto.
28. (N.S.) 5 A.M.	Throughout the whole of the Linththal.				Ditto.
30. At night.	On both sides of the Linth.				Ditto.
1702. Jan. 4. (N.S.) 6 A.M.	In the two valleys	One of the most vi- olent of these shocks.		The weather, which had been very cold for four days, became warm the day after.	Ditto.
Feb. 24. (N.S.) 9 P.M.	Ditto				Ditto.
March 8. About mid- night.	Etwa and the country round.	Several shocks.		Followed by an eruption which lasted until the 8th May.	Ditto.
June 17. (N.S.) A little before 10 A.M.	In the Linththal	A moderate shock			Bertrand; Scheuchzer; Coll. Acad.

1702. In summer.	At Benevento .....	.....	.....	Did great damage	Coll. Acad.; Baglivi, <i>loc. cit.</i>
— Sept. ...	Martinique	Violent shocks	Also felt at sea off the coast.	Houses were thrown down	Labat, Voyage aux Iles, t. vii. p. 440.
— Oct. 2. Before dawn in the morning.	In the Linththal	One shock .....	.....	On the 4th very heavy hail at daybreak	Bertrand; Scheuchzer; Coll. Acad.
— 18. Rome and Norcia .....	.....	A slight trembling .....	.....	Followed by continual rain and a south wind for nearly four months.	Collection Académique.
— Dec. 9. (N.S.) Before 5 A.M.	The whole of the Canton of Glaris, particularly Mollis.	Three very violent shocks, extending further than any of the preceding ones. Very violent. At Rome the first shock, which occurred at the hour mentioned, was vertical, very violent, and lasted nearly a minute.	.....	The people were not only rocked, but violently shaken in their beds.	Bertrand; Scheuchzer; Coll. Acad.
1703. Jan 14. 2 o'clock at night.	From Rome to Naples and Aquila, in a line running from N. a little W., to S. a little E. along the Apennines. Also felt slightly at Verona, Venice, and Trente.	.....	.....	The towns of Norcia, Cascia, Leonessa, &c., were ruined. At Rome the shock was preceded by a sudden gust of wind. The day there had been very windy, and very heavy rain had fallen. Some arches of churches in the same city were separated and afterwards closed again. The earth opened in many places, and fire, and water with an abominable smell of sulphur came forth.	J. G. Roserus de terremotu qui Italia nuper, primis anni 1703 mensibus affixit, Stettin, 1703; Jac. Phil. Maraldi, Observations, &c. in Hist. de l'Acad. des Sciences de Paris, 1704, Hist. p. 8; Coll. Acad.; Huot; Baglivi; Lettres Historiques; Vivenzio; Keferstein.
— 16. 21st hour.	Rome	A slight shock .....	.....	.....	Collection Académique.
— 18. In Abruzzo; especially at Aquila. Also felt at Mantua, Milan, and all the country at the foot of the Alps.	.....	Slight tremblings .....	.....	The weather remained wet from the 14th to the 25th, when it became fine, and remained so for fifteen days.	Roserus and Maraldi, <i>loc. cit.</i>
— Feb. 2. 18th hour.	Barcelona in Spain	A slight shock .....	.....	.....	Baglivi, p. 535.
— Feb. 2. 18th hour.	Rome and all the country affected on the 14th January; especially Aquila.	Several shocks. Direction = N. to S.	At the mouth of the Tiber the sea retired.	Aquila was completely ruined, and 5000 people perished there. The earth opened in several places, and threw out stones, water, &c. Noises like the reports of a pistol were heard.	Maraldi and the other authors just quoted.
— 3. 21st hour.	Rome	A slight shock, followed by two or three each day up to the 25th, during which period also more than 160 were felt at Aquila.	.....	.....	Ditto.

1.	2.	3.	4.	5.	6.
1703. Feb. 10. Valley of the Linth, (N.S.) 7½ A.M.	Valley of the Linth, Canton of Glaris.	Violent shocks .....	.....	The houses were much shaken. Half an hour before, a great noise was heard in the air.	Bertrand; Scheuchzer; Coll. Acad.
— 11. (Twenty-four hours later.)	Ditto (felt more violently at Bettschwanden than in the Linth-thal). N.B. Many of the shocks in this valley extended into the Grisons, for example to Dissentis.	Less violent than the last.	.....	Several times during the last year or two the fountains gave out more water than usual without any shocks being felt at the time.	Ditto.
— 25. About sunset.	Rome. Also felt at Eugubio (Duchy of Urbino), at Perugia and the neighbourhood, Spoleto, and S. Marino.	One shock at the time mentioned, three hours after a very violent one lasting fifteen seconds, an hour after, another, at 5 o'clock (Italian) a short but very violent shock, at 6 two slight ones, at 9 two more, the ground being in continual agitation until daybreak.	.....	The day was very wet at Rome, and there was much wind. The weather became calm about sunset, when the first shock took place. These shocks took place at Spoleto periodically at 9 o'clock (Italian time). The horses, oxen, dogs, birds, &c. showed the greatest uneasiness.	Maraldi and the other authorities quoted above.
— Mar. 14.	At Narni	A violent shock .....	.....	.....	Ditto.
— 18.	Aquila	Terrible shocks .....	.....	.....	Ditto.
— 27.	Ditto. Also at Rome, Foligno, and Spoleto.	Ditto .....	.....	Between this earthquake and the last 5000 persons perished at Aquila.	Ditto.
— 31. Before mid-day.	Rome and Aquila	Slight shocks .....	.....	.....	Ditto.
— April 1. 5½ 30 ^m P.M.	Ditto	Ditto .....	.....	.....	Ditto.
— 2.	Ditto	Ditto .....	.....	.....	Ditto.
— 8. Between 6 and 7 P.M.	Rome	Ditto .....	.....	The wind was from the south during the spring, which was wet and rather cold.	Ditto.
— 15.	Spoleto and many places in Umbria.	A violent shock .....	.....	.....	Ditto.
— 18. 13th hour.	Rome	One shock .....	.....	.....	Ditto.

1703. May 6. Frankfort on the Maine, and Hanau.	A slight earthquake.			Lersner's Chronik; Kriegk, <i>loc. cit.</i>
— 13. Genoa and Carmagnole in Piedmont.	One shock			Coll. Acad. &c. before quoted.
— 17th hour.				
— 15. Aquila				Ditto.
— 24. Aquila and Rome				Ditto.
9 P.M.				
— 25. Rome	Vertical			No more such were felt at Rome up to Jan. 1705. Ditto.
5th hour.				
— June 29. In and about Spoleto	A violent shock			Ditto.
23rd hour.				
— July 1 and 2. Genoa and Carmagnole in Piedmont.	Two slight shocks. The direction of these and the numerous preceding shocks was generally from N. to S.	The sea fell 6 feet in the harbour of Genoa, and remained so for nearly a quarter of an hour. The sulphurous water on the road from Tivoli to Rome fell 2½ feet. The water of the lake l'Inferno also fell about 3 feet. Wells too were much disturbed.	This year was very abundant in Italy, but after the earthquakes diseases of various sorts were very prevalent.	Ditto.
— Oct. ...	Norcia			Seyfart, <i>loc. cit.</i> p. 98.
— Dec. 29. (In the night of the 28th.)	Asti in Piedmont. Also felt in France.	A trembling. Shocks for half an hour.		Ditto.
— ...	Terni, Spoleto, Narni, Norcia, &c. Also at Naples and Milan, though with less violence.	The shocks recommenced.	Great damage done.	Lettres Hist. 1704, Fév. p. 126.
— ...	La Guayra and Caraccas			v. Humboldt, <i>loc. cit.</i> t. v. p. 5.
— ...	Japan			Kämpfer, v. Dohm, t. i. p. 120; Coll. Acad.
1704. Jan. 8. (N.S.) 5½, 3 or 4 P.M.	In England, at Hull; also at Beverley, South Dalton, &c. Most violent in the neighbourhood of Lincoln. Feeble at Selby and Navenby.	A sudden shock	The town of Jeddo was ruined, and 200,000 persons lost their lives there. Accompanied at Hull by a noise like the sighing of the wind, though the air was perfectly calm. Doors and furniture were set in motion, and chimneys thrown down. At Selby and Navenby a noise was heard like the rolling of carriages. Preceded by a violent tempest.	Phil. Trans. vol. xlv. p. 624; of 1745, vol. iv. p. 287; Coll. Acad.

1.	2.	3.	4.	5.	6.
1704. Jan. 30. Frankfort on the Maine. Between 6 and 7 P.M.		A trembling.....		Without damage.....	Lersner's Chronik; Kriegk, <i>loc. cit.</i>
— May 20. Duchy of Spoleto		Two vertical and violent shocks.		The feeble shocks had been almost continuous in the duchy up to this time. The same day an eruption of Vesuvius began, which lasted until July 23, 1706. v. Hoff gives the date May 30.	Baglivi, <i>loc. cit.</i> ; Coll. Acad.
— Nov. 4. At Zurich and the country round. Between 4 and 5 A.M.		Two violent shocks.....		Preceded by a brilliant meteor in the air. At the same time there was a violent storm of thunder, lightning and wind at Bâle, where however no shock was felt.	At Scheuchzer; Bertrand; Coll. Acad.
— Nov. to the following Jan.	Island of St ^a Maura in the Archipelago.	Many shocks		Did great damage	Collection Académique.
— About Dec. 7. At midnight.	Bologna and Florence.....	.....		.....	Ditto.
— Dec. 24. Island of Teneriffe		Violent shocks, succeeding one another so rapidly that twenty-nine were counted in three hours. They became still more violent.		.....	v. Buch, Canar. Insehn. p. 242; v. Humboldt, <i>loc. cit.</i> p. 392; Coll. Acad. &c.
— — 27. Ditto .....		.....		On the 31st an eruption near Guimar in Llano de los Infantes, on the side of the Peak. The eruption was very violent, and continued until the 26th February 1705.	Ditto.
1705. Jan. 20. 9 o'clock.	Rome	Slight		Between this and the 31st Naples was twice rather violently shaken, Spoleto and the neighbourhood, and Rimini several times.	Coll. Acad.; Baglivi, <i>loc. cit.</i>
— Feb. 6 and 7.	Naples	Two slight tremblings		At several places shaken in 1703 the earth was not yet quite at rest.	Seyfart, <i>loc. cit.</i> p. 98; Baglivi, p. 566.
— May 22.	Mollis and Nâfels (Canton of Glaris).	A very sensible shock .....		.....	Scheuchzer.
— June 3.	Ditto	Ditto .....		.....	Ditto.
— Sept. 24. 10 A.M.	Eglisau, and slightly in the rest of the Canton of Zurich.	.....	The Rhine was agitated.	.....	Bertrand; Scheuchzer; Coll. Acad.

1706, Nov. 13. Ditto. Also felt in several shocks. Between 3 and 4 p.m. at a part of Sweden, &c. desobues a.m.)				Accompanied in some places by loud noise. The snow had rapidly melted in the beginning of the month before a south wind, and caused disastrous inundations.	Ditto.
— 17. Zurich and Eggen. — 26. Coast of Peru near Arequipa.	More violent than the last.			The village of Areca in the district of Arequipa was ruined.	Ditto.
1706, April 4. Sicily and Calabria; especially at Aquila and Naples. Also felt at Rome.				Accompanied by an eruption in the same place as before.	Collection Académique.
— May 5. Tenerife.				Trapano del Vasto, 15 miles from Palermo, was ruined, and many people were killed. Huot gives as date the 30th October, and says that 1000 persons perished.	Seyfiart, loc. cit. p. 99.
— Sept. 29. In Sicily.				Thirty-six towns were ruined between Lanciano and Termoli on the coast of the Adriatic, amongst others Sulmona. 15,000 people perished. On the 18th November a black stinking vapour was perceived coming out from a chasm which had opened in the earth near Sulmona. This afterwards took fire, and burned for a short time.	v. Buch, Canar. Insecln. p. 243; v. Humboldt, loc. cit. t. i. p. 393. Seyfiart, loc. cit. p. 100.
— Oct. 28. In Calabria.					Ditto.
— Nov. 3. In Abruzzo.	A violent earthquake.				Ditto; Huot, loc. cit.
— Rome. — Grimså and Olvos in Arnes-Sysel, Iceland. — Frankfort on the Maine.	Two shocks.				Journal Historique, Janv. 1707, p. 18. Voyage en Islande, loc. cit.; v. Hoff.
1707, Feb. Night between 16 and 17. — In Spring. — May 18, 21, and 24.	Many shocks, followed by others for some time.			Followed on the 23rd by the commencement of a submarine volcanic eruption, consequent on the raising of the island Nea-Kameny between Palaia and Micro-Kameny. This island was not entirely at rest until 1711, the volcanic action being particularly violent until May 1708.	Lernæ's Chronik; Krieger, loc. cit.
					v. Hoff. Paris, 1707, p. 11; 1708, p. 28; Phil. Trans. vol. xvi. p. 19; vol. xxvii. p. 364; Roser's Jour. des Missions d'Islande; Let. dans le Levant; Let. d'Islande; Let. d'Islande.

1.	2.	3.	4.	5.	6.
1707. July 28. to Aug. 18.	Vesuvius and the neighbourhood.	Numerous shocks		The mountain was during this time in eruption.	Maria della Torre, <i>loc. cit.</i> ; Sorrentino, <i>Istoria del Vesuvio</i> .
— Sept. 18.	Island of Santorin	Slight		The new island increased considerably	Hist. de l'Acad. &c. just quoted.
— — 25.	Ditto			The doors of the houses opened of themselves.	Ditto.
1708. Feb.	Ditto	Slight		Accompanied by loud noise.	
Night between 9 and 10.				The principal shocks are here mentioned, but slighter ones appear to have been almost continuous for a long time.	Ditto.
— — 10.	Ditto				Ditto.
About 8 A.M.					
— March 3.	Calabria; especially at Maratea, Tortona, and Baronal.			Many houses and some churches thrown down.	Journal Historique, 1708, Mai, p. 341.
At the hour of vespers.	Manosque (in the Basses Alpes).	Rather violent			Mémoires de Trévoux, 1708, p. 2096.
— — 25.					
— Aug. 14.	Ditto. (Also extended to Toulon, Marseilles, Sisteron, and Hyères.)	A violent shock	The waters of the Durance were elevated 2 or 3 feet.	Accompanied by a noise which was variously compared to that produced by the breaking up of ice, to the discharge of artillery, bellowing, and rolling of vehicles. The earth opened on the river Lague, and flames came forth. Two whirlwinds did great damage at Manosque just at the same time as the earthquake.	Ditto; Seyfert.
— — 6 ^h 15 ^m A.M.					
— — 8 o'clock.	Ditto	Another shock			Ditto.
— — 10 o'clock.	Ditto	Ditto			Ditto.
— — 15.	Ditto	Two shocks on this day, the principal at the time mentioned, the hour of the other not given.			Ditto.
A little before midnight.		Another shock			
— — 23.	Ditto				Ditto.
3 A.M.		Ditto			Ditto.
8 ^h 15 ^m P.M.					
— — 26.	Ditto	Slight trembling			Ditto.
8 A.M.		Ditto; more violent			Ditto.
— — 11 A.M.					

1708. Aug. 26. 9 ^h 15 ^m P.M.	Ditto	.....	Three shocks .....	.....	Ditto.
— — — 27. 3 ^h 15 ^m A.M.	Ditto	.....	Three more shocks .....	.....	Ditto.
— — — 28. At night.	Ditto	.....	One shock .....	.....	Ditto.
— — — 29. 3 ^h 30 ^m A.M.	Ditto	.....	Fresh trembling .....	.....	Ditto.
— — — —	Ditto	.....	Ditto .....	.....	Ditto.
Before 4 A.M. — — — 30.	Ditto	.....	Another shock.....	.....	Ditto.
A little after 3 ^h 30 ^m A.M.	Ditto	.....	Ditto; rather violent	.....	Ditto.
6 ^h 45 ^m A.M. — — — —	Ditto	.....	Fourteen or fifteen slight shocks du- ring this time.	.....	Ditto.
Sept. 1 to 15.	Ditto	.....	Another slight shock	.....	Ditto.
— — — 15. After mid- night.	Ditto	.....	More sensible than the last.	.....	Ditto.
— — — 20. 3 ^h 30 ^m P.M.	Ditto	.....	Several shocks, con- tinuing during the first few nights of October.	.....	Ditto.
— — — 24. to 30. Every night.	Ditto	.....	More violent shocks	.....	Ditto.
— Oct. 6 and 12; espe- cially at mid- night and 2	Ditto	.....	.....	.....	Ditto.
A.M. Jan. 8. 1709. Mar. 20.	In the Canton of Glaris.	.....	Several shocks .....	.....	Keferstein. Collection Académique.
— — — —	Lima in Peru .....	.....	.....	.....	.....
2 A.M. April 15	In Peru .....	.....	Fourteen earthquakes during the time mentioned.	.....	Ditto.
— Jan. 1, to 1710.	The country bordering on Hernösand.	.....	.....	.....	Acad. des. Sciences de Stockholm, 1748, p. 155.
— Dec. 8. 1710.	Stein on the Rhine .....	.....	Several shocks.....	.....	Keferstein.

1.	2.	3.	4.	5.	6.
1710.	Island of Zante	A violent shock .....	.....	.....	Montgom. Martin, Hist. of the British Colonies, vol. v. p. 431.
1711. Jan. 7. Between 3 and 4 P.M.	Reggio in Calabria	Three shocks .....	.....	.....	Seyfart, <i>loc. cit.</i> p. 102.
— 11.	In Abruzzo .....	.....	.....	.....	Ditto, p. 103.
Feb. 9. Between 4 and 5 A.M.	Zurich and Bâle, extending as far as the Rhine. ....	.....	The waters of the Rhine “bouillonnent.” .....	.....	Coll. Acad. t. iii. p. 181; Acad. des Sciences de Paris, 1711, p. 4; Keferstein; Bachofen’s Chronik. Seyfart, <i>loc. cit.</i>
— May 10.	Venice .....	.....	.....	.....	Ditto.
— 17.	Bergen-op-Zoom.....	Several shocks.....	.....	During a storm of thunder, lightning, and hail.....	Ditto.
— 18.	In Sicily	Tremblings .....	.....	.....	Ditto.
— Oct. 6.	Paris and the environs for 30 leagues round. ....	.....	.....	.....	Coll. Acad. t. iii. p. 183; Acad. des Sciences de Paris, 1712, p. 7.
— 25.	Leipzig and the country round.	A very violent earthquake. ....	.....	.....	Seyfart, <i>loc. cit.</i>
About 7 P.M.	Constantinople .....	.....	.....	.....	Hadschi Chalifa.
1712. Beginning of the year.	Rome	One shock .....	.....	Threw down an arch of the Seminario Romano	Seyfart, <i>loc. cit.</i>
— Jan. 23.	Leghorn	A violent shock .....	.....	In February, March, April, October, and November of this year, Vesuvius was in eruption.	Ditto.
— Feb. 2 to May 21.	Jaen in Andalusia	Sixteen shocks during this period. ....	.....	.....	Valentyn, lib. ii. p. 58; Hist. gén. des Voyages, t. xi. p. 20; Phil. Trans., &c. Seyfart, <i>loc. cit.</i>
— April 10.	In and around Vienna; especially at Neustadt. ....	.....	.....	Did some damage	Seyfart, <i>loc. cit.</i>
— Aug. 11.	Bea (Bex?) and the whole government of Aigle, and the Valais.	A very violent shock .....	.....	Followed by a whistling sound in the air for some time. Some persons said that they had felt three shocks at the same places earlier in the month.	Bertrand; Coll. Acad.
— Between 11 P.M. and midnight.	Near Bosely in Shropshire.	One shock .....	.....	.....	Collection Académique.
— 1714. Jan. 13. 9 to 11 P.M.	Constantinople .....	.....	.....	.....	Hadschi Chalifa.
— May 25.	Brabant, Hainhault, and Liège. Also felt at Brussels and Maestricht.	Slight shocks .....	.....	Chimneys were thrown down at Maestricht and Brussels.	Coll. Acad.; Journ. Histor. 1714, Mars, p. 211.
— May 25.	Constantinople	Violent.....	.....	.....	Hadschi Chalifa.

1714. June 21.	The neighbourhood of Vesuvius.	Repeated shocks up till the 30th.	.....	The mountain in a state of violent eruption.....	Maria della Torre, <i>loc. cit.</i> p. 68.
— July 27.	Patras .....	.....	.....	Several buildings either thrown down or much injured.	Pouqueville, <i>Voyage en Grèce</i> , t. v. p. 295.
— Aug. 28.	Island of Cephalonia ...	Much more terrible than the last.	.....	280 houses were thrown down. The earth opened, and springs of hot water made their appearance.	Ditto.
— Sept. 3. Before 9 A.M.	In the Morea. Patras especially was much injured.	.....	.....	A portion of a church at Patras was thrown down.	Seyfart, <i>loc. cit.</i>
— Dec. 29. 7 ^h 30 ^m P.M.	District of Eglisau, Canton of Zurich.	.....	.....	.....	Bertrand; Scheuchzer; Coll. Acad.
— — — 9 P.M.	Ditto .....	.....	.....	.....	Ditto.
1715. Jan. 29.	Algiers	Repeated shocks, continuing six days.	.....	v. Hoff, without quoting any authority, gives as date the 2nd February.	Seyfart, <i>loc. cit.</i> ; Huot, <i>Cours de Géol.</i> t. i. p. 111.
— — —	In the Frioul, Italy	One shock .....	.....	.....	Ditto.
— Feb. 10.	In the Valais	Slight .....	.....	The weather, which had been cold, became mild immediately after the shocks.	Bertrand; Coll. Acad.
— — — 19.	Nantes	A trembling.....	.....	.....	v. Hoff.
— April 11.	Geneva.....	Three shocks .....	.....	.....	Bertrand; Coll. Acad.
— May 1.	District of Teschen in Silesia.	Oscillations for six and thirty hours.	.....	.....	Seyfart, p. 105.
— June 12.	At Delitzsch in Saxony, and also the village of Klebitz.	.....	.....	During a storm of thunder and hail	Ditto.
— — —	Probably in the Morea .....	.....	.....	.....	Pouqueville, <i>Voyage en Grèce</i> , t. v. p. 295.
1716. Jan. 2.	In the Canton of Zurich	One shock .....	.....	.....	Keferstein.
— — — 29	"Bei Görz im Kloster Constantia." (In Illyria?)	Repeated shocks .....	.....	.....	Seyfart, <i>loc. cit.</i>
— Feb. 3.	.....	.....	.....	.....	.....
— Feb. 3.	Algiers	Violent.....	.....	Many houses thrown down	Journal Historique, Avril, 1716, p. 269.
— 2 A.M.	Ditto	Frequent shocks .....	.....	.....	Ditto.
— — — 4.	Ditto	Ditto .....	.....	.....	Ditto.
— — — 5.	Ditto .....	.....	.....	Lima and Arequipa were greatly injured	v. Humboldt, <i>Voyage</i> , t. i. p. 317.
— — — 6.	In Peru .....	.....	.....	.....	Bertrand; Scheuchzer; Coll. Acad.
— April 5. 10 ^h 8 ^m April 5. 7 ^h 30 ^m P.M.	Eglisau, Canton of Zurich.	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
1716. May and June.	Algiers. Also felt, though with less violence, at Catania and Syracuse.	Violent earthquakes .		At Algiers 20,000 persons perished. Shaw, in his Travels in Barbary, gives this event without the date of the month, but it doubtless is the same. He adds that great landlips took place from the sides of the hills near El Kadarah and at other places.	Collection Académique.
— June 25.	Geneva, Nion (Sion ?), and Morges.	Several shocks.....			Bertrand; Coll. Acad.
— — 29.	Geneva.....	Ditto			Ditto.
Between 10 and 11 P.M.					
— Nov. 26. 3 P.M.	Neufchatel and the environs.			On the 20th at 2 P.M. a noise had been heard in the Val-de-Ruz in this Canton, supposed by some to proceed from the air, by others from the earth.	Ditto.
— Dec. 1. 4 A.M.	Messina and Catania. Most violent at the latter place.			Houses were thrown down at Catania	Seyfert, <i>loc. cit.</i>
—	In central Asia, through the whole of the district Dzoungarie, between the lakes Balkhache and Dsaisang.	Very violent		The town Aksu, to the south-west of the volcano of Pechan, was almost wholly ruined.	Falk, Beiträge zur Topographie der Russischen Reichs. (St. Petersburg, 1785), t. i. p. 380.
1717. April 22.	The Lipari Isles, especially Vulcano; and in the north of Sicily, most violent at Milazzo, Pozzodigotto, and Castrocale.	Violent			Kefenstein.
— June 15 to 17.	Syracuse and Messina....	Several shocks		Did some mischief	Collection Académique.
— — 27 and 28.	Catania	Ditto; violent.....		Preceded by loud subterranean explosions. Vesuvius was in full eruption during this month.	Ditto.
— July 1.	Smyrna	Two little shocks			Ditto.
— — 6. 4 P.M.	Eglisau				Ditto; Bertrand; Scheuchzer.
— Aug. 5. Shortly before midnight.	Algiers.....	A very considerable earthquake. •		Did much damage	Collection Académique.

1717. Aug. 9.	At Neufchatel, and in the canton of same name.	.....	.....	The spring had been extremely cold.....	Ditto; Scheuchzer; Bertrand.
— Sept. 27.	In Mexico .....	.....	.....	.....	v. Humboldt, t. ii. p. 298; Sonneschmidt, Bergw.—Reviere von Mexico, p. 323.
— Dec. 18.	Eglisau .....	.....	.....	.....	Bertrand; Scheuchzer; Coll. Acad.
8 P.M.	.....	.....	.....	.....	Ditto.
— At noon.	Ditto .....	.....	.....	.....	Ditto.
.....	Cæsarea in Asia Minor .....	.....	.....	Much damage done to the city	Hadschi Chalifa.
1718. Feb. 1.	Fayal in the Azores ..	.....	.....	Accompanied by a dreadful noise. Followed by a volcanic eruption which lasted some time.	Collection Académique.
.....	.....	.....	.....	v. Hoff speaks of an eruption in another of these islands, El Pico, on the same day, but only mentions this earthquake in a note.	
— 25.	Leipzig .....	.....	.....	The wind was violent. Not mentioned by any of the other authorities but the Coll. Acad.	Ditto.
— March.	Island of St. Vincent in the West Indies. Also at Martinique.	.....	Near Martinique a piece of land rose from the sea with a terrible noise and then sank again.	In St. Vincent accompanied by a furious hurricane, and an eruption of the volcano Morne-Garon.	Eyriès, Abrégés des Voyages; v. Humboldt, t. ii. p. 295; Mém. de Chron. t. ii. p. 923.
— March.	Catania .....	.....	.....	Houses were thrown down. The eruption of Vesuvius still continued.	Collection Académique.
About 18.	.....	.....	.....	The earth opened in many places, forming fissures of great depth.	Ditto.
— May or June.	Ile de Feu, île Brave, île Sans-Fond, île Cores, and île Canarie—Canary Isles.	.....	.....	.....
— June.	Neustadt (8 miles from Vienna), and the neighbourhood.	.....	.....	Buildings were thrown down.....	Collection Académique.
Night between 15 and 16.	.....	.....	.....	.....
— 19.	Sin-gan-San or Sin-Sou-Sou, the capital of the Chinese province Xansi, and the country all round.	.....	.....	The surface of the earth was greatly altered. Huge chasms opened in many places, and great landlips took place from the mountains.	Coll. Acad.; v. Hoff.
3 A.M.	.....	.....	.....	.....
July 9.	Ditto .....	.....	.....	.....	Ditto.

1.	2.	3.	4.	5.	6.
1718. July 17. Between 5 and 6 P.M.	Eglisau (and not in the Canton of Neufchatel).	.....	.....	.....	Coll. Acad.; Bertrand; Scheuchzer.
— — — — —	Canary Isles; princi- pally in the île de Fer (Feu?), Forteventura, and Canarie properly so called. Also felt in the Azores.	Shocks for fifteen days	.....	Chasms opened in the ground, and rocks were thrown from the hills.	Collection Académique.
— Dec. (or Near May) 1.	Hernösand in Sweden.	The first trembling, which was violent and lasted about a quarter of an hour, was followed by twenty others of less importance. Several shocks.....	.....	Followed by the opening of fissures in the moun- tains.	Acad. des Sciences de Stockholm, 1748.
— — — — — 10.	Eglisau (and not in the Canton of Neufchatel).	.....	.....	.....	Bertrand; Scheuchzer; Coll. Acad.
Between 5 and 6 P.M.	Island of Cyprus.....	.....	.....	The capital of the island was destroyed, and many persons lost their lives in the ruins.	Mercur de France, Déc. 1718 (sous la Rubrique de Gènes. 12 Déc. p. 179).
1719. Jan. 7.	Padua, Ferrara, Bologna, Venice and some of the neighbouring islands.	Several shocks.....	.....	A chimney was thrown down at Venice, and some walls were cracked.	Coll. Acad.; Journal Historique, 1719, Mars, p. 227.
— — — — —	Jamaica .....	.....	.....	.....	Collection Académique.
— March 5.	Constantinople	Violent shocks .....	.....	.....	Ditto; v. Hoff.
— — — — — 6.	Ditto. Also at Villanova in Algarbia, Portugal, and in many other parts of the same kingdom; and at se- veral places in Cham- pagne and Lorraine.	Lasted four minutes in Portugal. The move- ment was but slight in Champagne and Lor- raine. At Constantino- ple the shocks did not cease for thirty days. Many shocks .....	.....	At Constantinople two mosques were ruined, and many people killed. In Champagne and Lor- raine accompanied by thunder and lightning.	Ditto; Journal Histor. 1719, Juin, p. 405; Phil. Trans. vol. xlix. p. 116.
— — — — —	Smyrna and Aleppo ...	.....	.....	At Aleppo three mosques and 200 houses were ruined.	Ditto.
— March and beginning of April	In Tuscany, at Piacenza, and as far as Perugia and Viterbo	Rather violent shocks at intervals.	.....	.....	Ditto.

1719. May 23.	Syracuse	Several shocks, recurring for some days. Very violent. At Constantinople the first shock lasted three minutes, followed, an hour after, by another of less violence, and at intervals by others for three days.	.....	.....	Several houses thrown down.....	Journ. Hist. Sept. 1719, p. 185.
— 25.	Constantinople, and in Natolia, forty miles from that city. Also between Scutari and the île des Princes, and at the town of Sevenit. Also at Nicomedia.	.....	.....	.....	During the first motion a black powder was seen to rise from the town and suburb of Galata, beside the sea. Four or five villages were ruined, and about 1000 people killed or maimed. Great damage was done to the buildings of Constantinople itself. Nicomedia also was ruined.	Ditto; Hadschi Chalifa; Coll. Acad.; Phil. Trans. vol. xlix. p. 116; Mercure de France, Juillet, p. 113; Août, p. 103.
— June 25.	Smyrna	A violent earthquake	.....	.....	No damage done.....	Collection Académique.
— 29.	Rome, Norcia, Chieti, Spoleto, and Foligno.	Less violent at Rome than at the other places mentioned.	.....	.....	.....	Ditto.
— July...	Sinigaglia and Nocera in Italy.	Slight trembling.....	.....	.....	.....	Ditto.
— ...	Along the coast of Fez and Morocco.	Very violent .....	.....	.....	Many villages and a part of the city of Morocco were ruined. Probably simultaneous with the last.	Ditto.
— ...	Juny in the north of China.	.....	.....	.....	Very many buildings thrown down	Bell's Travels in Asia, in Pinkerton's Voyages and Travels, vol. vii. p. 377.
— Dec. Towards the end of the month.	Terceira and St. Michel in the Azores.	Very violent .....	.....	.....	Accompanied by volcanic eruptions. The Collection Académique gives the date 1720.	v. Buch, <i>loc. cit.</i> ; Phil. Trans. vol. xxvi. p. 69, xxvii. p. 353, xxxi. p. 100, xxxii.; Hist. de l'Acad. des Sciences, &c.
1720. Jan. 10.	Genoa and Leghorn ...	Slight trembling .....	.....	.....	.....	Collection Académique.
— Feb. 26. 7 ^h 30 ^m A.M.	Eglisau, Canton of Zurich.	.....	.....	.....	.....	Ditto; Bertrand; Scheuchzer.
— April...	Peru.....	Shocks lasting for eight days.	.....	.....	The town of Guamanga was ruined	Collection Académique.
— Begin. of June.	In Calabria. Violent at Barletta and Ascoli, less so at Salerno, Cava, Avelino, and Sarene. (These places are properly not in Calabria, but in Capitanata and Principatoultra, in a line passing through the Apennines from E. to W.)	.....	.....	.....	.....	Ditto.

1.	2.	3.	4.	5.	6.
1720. June 11.	Pekin in China .....	.....	.....	The city much injured. Probably this event is only the same with that in 1724.	Phil. Trans. 1769, p. 71.
— 16.	In the Canton of Zurich.	.....	.....	.....	Coll. Acad.; Bertrand; Scheuchzer.
— 22.	Constantinople .....	.....	.....	.....	Collection Académique.
— July 1.	In the Saxon Erzgebirge; especially at Freiberg and the neighbourhood. Also at Leipzig, Halle, Weimar, Meissen, and in Voigtland, in Thuringia, &c.	A slight shock..... Violent in the Erzgebirge; at the other places mentioned, slight, but lasting some minutes.	.....	Extended in the Erzgebirge seven or eight miles in length, and felt in the mines at the depth of 169 toises. A magnet let its keeper fall, but sustained it afterwards just as well as before. Accompanied here by thunder and hail. Two days before, the barometer descended suddenly and rapidly at Freiberg.	Ditto; Journ. Hist. Sept. 1720, p. 175.
— Aug. 27.	In the kingdom of Naples.	.....	.....	Did some mischief at the monastery of Monte Cassino.	Collection Académique.
— Sept. 9.	Zurich. Also at Messina in Italy at the same time.	.....	.....	Did some damage at Messina.....	Ditto.
— 12.	In Calabria; especially at Gerace on the Ionian Sea.	.....	.....	Gerace was ruined	Ditto.
— Oct. 18.	In the Canton of Neuchâtel.	.....	.....	During a violent tempest	Ditto; Bertrand.
— Nov.	Leghorn	A trembling.....	.....	.....	Coll. Acad.; Phil. Trans. t. li. p. 577.
Night between 19 and 20.	.....	.....	.....	.....	.....
— Dec. 20.	Several parts of Switzerland, as St. Gall, Turgau, the borders of the lake of Constance, at Constance, Stein, Appenzell, Reinegg, Altstätten, and as far as Lindau in Bavaria. Also, though feebly, at Zurich.	Lasted about a minute.....	.....	Accompanied by noise, and followed by a warm wind and sulphurous vapour. In some places houses were thrown down.	Bertrand; Scheuchzer; Coll. Acad.
— 8 A.M.	St. Gall... ..	More shocks' .....	.....	At Zurich the barometer was at 26 in. 5½ lines on the 19th, and on the 20th at 26 in. 3 lines.	Ditto.
About 1720—1730.	Neighbourhood of Her-nösand.	.....	.....	Extended for 30 miles to the north and to the south.	Acad. des Sciences de Stockholm, 1748.
1721. Mar. 24.	Selva in the island of Majorca.	.....	.....	Accompanied by a subterranean noise and by inundations. Several houses were thrown down.	Journ. Hist. Juillet, 1721, p. 21.

1721. April 4.	In Hungary.....		The city was entirely ruined and more than 8000 persons lost their lives. Perrey says 9th or 26th April. Accompanied by an eruption of the volcano Katlegiaa.	Collection Académique. Vivenzio, 1783, p. 150; Malcolm's History of Persia, vol. i. p. 614; Journ. Hist. Oct. 1721, p. 276. v. Hoff.
— May 11.	Myrdaleu in Iceland ...		At Bâle, where some walls and chimneys were thrown down, accompanied by a subterranean murmur, at Porentrui by a loud noise, and followed by a strong odour. The cold became extremely sharp for a short time immediately after the earthquake. Some days afterwards great storms, which did much mischief in Italy.	Bertrand; Scheuchzer; Coll. Acad.; Dan. Bachofen's Chronik.
July 3.	Throughout almost the whole of Switzerland; especially in the Canton of Bâle, at Wal-lenburg, at Porentrui, and at Mühlhausen.		Houses injured	Journ. Hist. Oct. 1721, p. 276. Coll. Acad.; v. Hoff.
7 ^h 45 ^m A.M.	In the Canton of Berne along the Aar; slightly in Lucerne; more violently in Zurich. Extended as far as Strasbourg.	A rather violent shock	Houses were thrown down, and bells sounded of themselves. Rather violent at Albufera, Loulé, Silves, Faro and Tavira, where it was accompanied by loud noises and great destruction of buildings. The latter of the two journals quoted gives the date 27th January 1723, but this is probably only a mistake.	Gazette de France, 20 Février, 1723. Ditto; Journ. Hist. Avril, 1723, p. 268.
Aug. 3.	Venice	Several shocks.....	On the 23rd June Vesuvius, and in the following November Etna, were in eruption.	Bertrand; Scheuchzer; Coll. Acad. Gazette de France, 1723, Sept. 25 and Oct. 2.
1722. May 24.	St. Jago in Chili.....	Shocks for from one to three minutes.	Preceded, some seconds before, by a loud noise	Shaw's Travels in Barbary, in Pin-kerton's Voyages and Travels, vol. xv. p. 608.
Nov. 29.	Algiers.....	Slight trembling.....	Accompanied by the eruption of Krabla, a mountain not before known to be a volcano. This eruption continued at intervals until 1730.	Coll. Acad. t. v. p. 64; Acad. des Scien. de Paris, 1725, p. 4.
Dec. 27.	Portman and Villanova in Portugal, and in fact all the south coast from Cape St. Vincent.	Several shocks.....		
Between 5 and 6 P.M.		Ditto		
1723. April 13.	Eglisau	A slight trembling, not lasting more than a minute.		
About Aug.	Faenza, Fiorenzuola, and in the Mugello.	Very violent.....		
Aug.	Barbary, about Algiers			
Jan. 13.	In Bretagne			
8 P.M.				
May 17.	Thyngsore-Syssal in Ice-land.			

1.	2.	3.	4.	5.	6.
1724. June 11. 9 A.M.	Pekin and many places in the province of Xansi in China.	The shocks lasted about four minutes.	.....	Houses were thrown down, and about 1000 people killed.	Du Halde, Description de la Chine, t. i. p. 481.
— — — — — Noon.	Ditto	More shocks .....	.....	.....	Ditto.
— — — — — 7 ^h 30 ^m P.M.	Ditto	Ditto .....	.....	.....	Ditto.
— — — — — Oct. 12.	Lisbon	Two very violent shocks, with an in- terval of some hours.	.....	Many walls were cracked	Balbi, Essai Pol. sur le royaume de Portug. t. i. p. 102; Journ. Hist. Jan. 1725, p. 40.
— — — — — Dec. ...	Sienna	Many shocks, lasting altogether ten hours.	The Arno was disturb- ed in its course.	M. Pilla gives the date December 11, 1 P.M. ...	Gazette de France, 20 et 27 Janv. 1725; Journ. Hist. Mars, 1725, p. 203.
— — — — —	Sciaccia in Sicily	Shocks during some months.	.....	.....	Ferrara, Campi flegrai della Sicilia.
— — — — —	Forty leagues to the west of Lisbon.	.....	Though not expressly stated, of course this was felt at sea.	.....	Collection Académique.
— — — — —	Constantinople	Violent .....	.....	.....	Hadschi Chalifa.
— — — — —	In Barbary; principally at Algiers. Extended from Miliana to Bona.	At sea three shocks were felt.	Also felt on board an Algerine vessel, at sea, 5 leagues S. of the Seven Capes, north coast of Africa (no ground with a line of 200 fathoms). It ap- peared as if a weight of several tons had been let fall on the ballast.	The barometer very high, and the air calm and serene. No immediate change of either after the earthquake.	Shaw's Travels in Barbary, in Pin- kerton's Voyages and Travels, vol. xv. p. 608.
— — — — —	In Denmark .....	.....	.....	.....	Edinburgh Encyclopædia, Article Chronology.
1725. Jan. 8.	Lima and Arequipa in Peru.	.....	.....	.....	Vivenzio; v. Hoff.
— — — — — 15.	Antigua	Violent. Lasted three minutes.	.....	.....	Gazette de France, 19 Mai, 1725.
— — — — — (O.S.?) 7 P.M.	Tchitinsk in the neigh- bourhood of Baikal.	A very violent shock. = <i>Unstetigkeit</i>	.....	Enormous fissures were produced both in the land and ice. Everything which was suspended in the houses was set in motion. The weather was calm.	Pallas, Voyage, t. iv. p. 396.

1725. April 17. Florence	Rather violent .....	.....	.....	Gazette de France, 19 Mai, 1725.
— 20. Ditto	Ditto .....	.....	.....	Ditto.
— June 17. Venice	Two slight shocks .....	.....	.....	Ditto, 13 Octobre.
About 11 A.M.				
— 30. Naples	Violent .....	.....	.....	Ditto, 4 Août.
— July 1. Ditto	Ditto .....	.....	For eight days Vesuvius had been throwing out ashes, flames, and smoke.	Ditto.
— Aug. 3. District of Eglisau. Both banks of the Rhine were shaken.	.....	.....	.....	Bertrand; Coll. Acad.; Scheuchzer.
— Sept. 17. Padua .....	.....	.....	.....	Toaldo, Essai Météor. p. 270.
17th hour.	.....	.....	.....
— Oct. At Mola, Forli, Fontana, Casola, &c.	Several slight shocks.	.....	.....	Journ. Hist. Fév. 1726, p. 109.
the latter end of the month.	.....	.....	.....
— Nov. 4. Faenza in Romagna	Some rather violent shocks.	.....	.....	Gazette de France, 8 Déc. 1725.
— 28. Ditto	Ditto .....	.....	.....	Ditto, 15 Déc.
— Constantinople .....	.....	.....	.....	Hadschi Chalifa.
1726. At the At Leghorn and Florence	.....	.....	.....	Gazette de France, 25 Mai, 1726.
beginning of the year.	.....	.....	.....
— Feb. 6. All the eastern side of Sicily; principally at Palermo.	Very violent .....	.....	.....	Huot, Cours de Géol.
— 16. District of Eglisau .....	.....	.....	.....	Bertrand; Scheuchzer; Coll. Acad.
— April 9. Sienna and the neighbourhood.	One very violent shock, followed by two other slighter ones.	.....	.....	"Manoscritto presso il cav. Perfetti."
About the 4th hour of the night.	.....	.....	.....
— 15. Aleppo. Also felt at Alexandretta at the same hour.	Three rather violent shocks from E. to W. in two minutes.	.....	.....	Mercure de France, 1726, Oct. p. 2349.
May to Sciacca in Sicily	Numerous shocks .....	.....	.....	Michele del Bono, loc. cit.
Oct. July 7. Eglisau, Hiltenberg, Glatfelden, Berne, some parts of the Pays de Vaud, Frütingen, and the neighbourhood, and throughout the Sibenthal.	.....	.....	The springs were troubled.	Bertrand; Scheuchzer; Coll. Acad.
7 A.M.	.....	.....	.....

1.	2.	3.	4.	5.	6.
1726. Sept. 1. Between 10 and 11 P.M.	Palermo	The first shocks were comparatively slight, but they increased rapidly in violence, and continued for twenty-four or twenty-five minutes.	.....	A quarter of the town was completely ruined. Four churches, ten palaces, and 1600 houses were thrown down, and from 3000 to 6000 persons perished. The earth opened in one street, and threw out burning sulphur and red-hot stones, which reduced the houses of that quarter to ashes in less than half an hour. During the earthquake the atmosphere appeared as if on fire. Half an hour before a loud noise had been heard in the air. According to v. Hoff, there was another earthquake a few days after at Noto. Ferrara gives the date for the event at Palermo, November 1.	Coll. Acad.; Gazette de France, Oct. 11 et 19; Borouaki, <i>loc. cit.</i> ; Journ. Hist. Déc. 1725, p. 420.
— Oct. 17. About 7 P.M.	Naples	Two shocks, followed by a third an hour afterwards.	.....	.....	Gazette de France, 30 Nov., 1726; Journ. Hist. Janv. 1727, p. 46.
— — 31. Between 10 and 11 P.M.	Ditto	A slight shock, and an hour afterwards another rather more violent.	.....	.....	Gazette de France, 6 Déc. 1726.
— Nov. 6. About 6 A.M.	Ivelcelster (Ilchester?) in England.	A rather violent shock.	.....	.....	Ditto, Nov. 30.
—	In the northern part of Iceland.	Several shocks.....	.....	Accompanied by an eruption of the volcano Krabla. Both this year and the next were marked by several volcanic eruptions in Iceland, most of which are said to have been preceded by subterranean commotions.	De Kerguelen Trénarec, Voyage dans la Mer du Nord, p. 37; Hist. gén. des Voyages, t. xviii. p. 11; Coll. Acad.
1727. Jan. Night be- tween 5 and 6.	Palermo	Five consecutive shocks.	.....	.....	Journ. Hist. Mai, 1727, p. 349.
— — 6.	Ditto, and extending over all Sicily.	Two more shocks ...	.....	The town of Noto was much injured. (v. Hoff gives as date for this the 5th January.)	Ditto.
— — 7.	Palermo	Another shock.....	.....	.....	Ditto.
At midnight.	.....	.....	.....	.....	.....
— — 8.	Ditto. (Several of these shocks were felt at Malta.)	Another, as violent as those of Jan. 11, 1693.	.....	Many houses damaged	Ditto.
— May 12. 6 A.M.	Frankfort on the Maine.	.....	.....	Did some damage to buildings	Larmer's Chronik; Kriegk.

— Oct. 4. Naples. Extended also to Swabia and England.	.....	.....	.....	continuing so for some days.	Huot, <i>loc. cit.</i>
— Nov. 9. New England (N.S.). Between 10 and 11 P.M.	.....	.....	.....	Accompanied by loud subterranean explosions. Preceded by an extraordinary calm; the stars sparkling brilliantly. The earth opened at Newbury, 40 leagues (or English miles?) N.E. of Boston, and threw out fine sand with ashes and pieces of sulphur.	Phil. Trans. vol. xxv. pp. 33, 63, and 124, vol. l. p. 9; Coll. Acad.
— — 7 Martinique to 27.	.....	.....	.....	Walls were cracked vertically, and one horizontally; many being thrown down. A considerable piece of land sank into the earth. Preceded by a loud noise	Journ. Histor. Mars, 1728, p. 229; Huot, Cours de Géol. t. i. p. 112. Phil. Trans. <i>loc. cit.</i>
— — 18. Newbury in New England. 11 (A.M.?)	.....	.....	.....	.....	.....
— — Tabriz in Persia 1728. Jan. 30. New England 2 P.M.	.....	.....	.....	The city was ruined, and 77,000 people perished.	Huot, <i>loc. cit.</i> ; Hadschi Chalifa. Phil. Trans. vol. l. p. 13.
— Feb. Epstein, three miles from Wiesbaden.	.....	.....	.....	.....	v. Hoff.
— Aug. 3. In Alsace, Switzerland, and part of Germany; especially at Berne, night, and at Strasburg Zurich, Eglisau, Bâle, there were five shocks Strasburg, Mannheim, on the 3rd at 10 ^h 30 ^m and all the country A.M., 4 P.M. (the most between Worms, violent), 4 ^h 30 ^m P.M., Mayence, Frankfurt, 9 P.M. and midnight; Offenbach, Hanau, and two on the 4th, at and Aschaffenburg. 2 ^h 15 ^m A.M. (very violent), & 3 ^h 45 ^m (slight). Also at Geneva.	.....	.....	.....	The bell of the great clock at Berne sounded five times, and at the same place they had had the day before a violent tempest with thunder. At Strasburg the earthquake extended 30 leagues east and west. Perrey says, without however quoting any authority, that an earthquake was felt this day at dawn at Newbury in New England; and that shocks had been experienced there every month this year except April.	Journ. Hist. Oct. 1728, p. 287; Bertrand; Coll. Acad.; France Pittor. art. Strasburg; Bachofen's Chronik; Lerner's Chronik; Kriegk.

1.	2.	3.	4.	5.	6.
1728. Sept....	China .....	.....	.....	.....	Edinburgh Encyclopædia, Article Chronology.
— Nov. 28.	Luçon in the Philippine Islands, especially at Manilla.	.....	.....	Great devastation at Manilla	Don Ildefonso de Aragon, Description Geogr. y Topogr. de la Ysla de Luzon, Manilla(1819), t.i. p.8.
1729. Jan. 13. Between 10 and 11 P.M.	A great part of Switzerland; especially at Berne, more violently on the lakes of Thun and Brienz, at Interlachen, Spiez, Zurich, Frütigen (most violently of all), Rettingen, Constance, Bâle, Lausanne, Geneva, Vevey, and generally through the Canton du Vaud.	At Zurich there were three shocks, the first at the hour mentioned, the second at 2, and the third at 5 the next morning. At Frütigen the shocks recurred periodically for eight nights, beginning at 10 at night and ending at 7 the next morning. At Rettingen the earthquake lasted several days.	The boats upon the lakes of Thun and Brienz were violently driven on shore.	Cracks were produced in the castle of Interlachen; that of Spiez was much shaken. Lightning was observed some days before at Zurich. The night was fine but very cold, and a slight wind had been blowing from noon. From time to time this wind would become stronger, and then cease, and at the moment of its ceasing the shocks would recur. The walls of the church and castle of Rykenbach were cracked. The earth opened at a short distance from the Sibenthal. Some damage was done at Constance.	Bertrand; Coll. Acad.; Bachofen's Chronik.
— 18. 9 ^h 15 ^m P.M.	Geneva and Bâle.....	Another shock.....	.....	.....	Ditto.
— Mar. 25.	Newbury in New England.	Repeated slight shocks from this date until 1741.	.....	For details of these numerous slight shocks see Phil. Trans. vols. xxxv. and l. Phil. Trans. loc. cit.	Phil. Trans. vols. xxxv. and l.
— June 1. 2nd hour of the night.	Sienna	A violent shock .....	.....	.....	Macchi, nelle sue Memor.
— 5th hour.	Ditto	A slight shock.....	.....	.....	Ditto.
— 2. In the morning.	Ditto	Ditto .....	.....	.....	Ditto
— About noon.	Ditto	Ditto .....	.....	.....	Ditto.
— Night between 22 and 23.	Florence, and the country for at least six or seven leagues round.	Very violent for ten minutes.	.....	Some houses were ruined	Journ. Hist. Sept. 1729, p. 195.
— Some time after the last.	Velletri .....	.....	.....	Bertrand says for this year—Sundry earthquakes in Italy.	Ditto.

1729.	Constantinople	Several earthquakes			Hadschi Chalifa. Bertrand; Coll. Acad. v. Hoff.
—	Sweden			The city of Meaco was destroyed. A volcanic eruption took place soon after. According to the Journal de Physique, t. xiv. p. 111, this event should be placed in the year 1730.	
—	Japan			No damage done.	Journ. Hist. 1730.
1730. Mar. 28.	Genoa	One shock		Houses were thrown down at Massa-di-Carrara, and many people perished in the ruins.	Ditto.
— — — In the course of the month.	Different points in Italy; especially at Massa-di-Carrara.	Several shocks.			
— May 12.	Rome, Tivoli, Aquila, Norcia, Cascia, Viterbo, Matrica, Monteleone, &c. Sulmona also suffered much.	At Rome but one shock was felt, which lasted nearly six minutes (?). At the other places three shocks were experienced, of which the last was the most violent at Norcia. The shocks continued almost every day up to the 28th, when there was another violent one.		At Tivoli some walls were cracked; at Norcia the shock was so violent that almost all the houses were thrown down. More than 500 persons perished there.	Ditto.
About 10 P.M.					
— June 12.	In Abruzzo. Also slightly at Messina.	Several slight shocks at Messina.		Leonessa was almost entirely destroyed	Ditto.
— July 8.	Concepcion in Chili	Several shocks.	Accompanied by a violent agitation of the ocean, which, at the first shocks, suddenly retired, and then returning inundated the city and adjoining country.	The city terribly injured	Hist. gén. des Voyages, t. xix. pp. 415 and 419.
8 A.M.					
— — — 9.	Ditto	More shocks, recurring at intervals for many months. Rather violent.		Completed the destruction of the city	Ditto.
— Night between 24 th and 25.	In Heligoland				Observ. Bromann.; Acta Litt. et Scientif. Sueciæ, III. A. p. 105.
Nov. 30.	Island of Graciosa, in the Canaries.	Two violent shocks.		Followed by a volcanic eruption	Journ. Hist. Mai, 1731, p. 350.

1.	2.	3.	4.	5.	6.
1730. Dec. 6. At the western point of Tenerife.				The earth opened, and a little hill sank into the fissure.	Journ. Hist. Mai, 1731, p. 350.
— — — — — Kieff in Russia					Nova Acta Acad. Petropol. t. xv.; Hist. p. 71.
1731. Beginning of the year	China			Four provinces were much injured by earthquakes.	Gentleman's Magazine, vol. l. p. 309.
— — — — — Mar. 20. (N.S.) 4 A.M.	At Naples and in Puglia.	Very violent. First there was a trembling, then a pulsation, and finally a rocking motion like that of a ship, lasting altogether three min. and some seconds.	At Siponto and Barletta the fishermen perceived a sudden raising of the sea which nearly wrecked their boats, although there was no wind.	The heavens were obscured by heavy clouds, which afterwards cleared away before a gentle breeze from the North. Water was thrown out from wells of 30 or 40 feet deep.	Phil. Trans. (edit. 1745) t. ii. p. 398; Journ. Hist. Juin, 1731, p. 411; Seyfert, p. 111; v. Hoff.
— — — — — 21. 8 A.M.	Ditto	Shorter and less violent than the last.		<i>Confounding</i> = <i>Manfronia</i> The heavens were clear, but the sun appeared pale as if obscured by thin vapour. Before this earthquake the inhabitants of the Terra-di-Barri perceived around Monte Gargano a sort of flame like sudden lightning, which vanished in smoke. In the neighbourhood of Foggia this and the other earthquakes of April, October, and November, were observed to be preceded in general by violent wind from the north-east. Sometimes however it was quite calm. These aerial phenomena were accompanied by terrible noises in the open country. Foggia was greatly injured. It was supposed to be the centre of the shocks, and that they diminished in the ratio of the square of the distances of the places at which they were felt from it. About 600 persons perished. A spring of hot water made its appearance.	Ditto.
— April 17.	Foggia and its environs	Fifty shocks during the day.		3600 persons perished	Journ. Hist. 1731, Juillet, p. 46.
— June 4.	The island of Lancerote, one of the Canaries.	Violent shocks.		Accompanying a very violent and most remarkable volcanic eruption, which began on the 1st September 1730, was extremely violent for two years, and did not entirely cease until the 16th	v. Buch quotes the account of Don Andr. Lorenz. Curbato, the curé of Ynisa in the island.

1731. June 15. Between 10 and 11 P.M. — Sept. 20. In the Abruzzo	Violent..... Very violent. Many other slighter shocks during the month.	..... ..... .....	The dome of the Porte de la Couronne fell Several buildings thrown down. It was re- marked that this earthquake and that of the 20th March were each just two days before the equinox. Many buildings were thrown down at Canosa....	Acad. des Sciences de Paris, 1731, Hist. p. 19; Coll. Acad. t. vii. p. 100. Journ. Hist. 1731, Déc. p. 413. Ditto, 1732, Janv. p. 42.
— Oct. 17. At Naples, and in Puglia and Abruzzo. — 19. Aynho in Northampton- (N.S.) 3 A.M. — 21. Ditto, and in the neigh- (N.S.) 4 A.M. bourhood, at Bloxham (4 miles S.W.), Bar- ford (5 miles off), Ban- bury (4 miles W.), Adderbury (1 mile W.), Croughton (1 mile E.), and Charlton (1 mile N.); but it does not appear to have ex- tended to the south or south-east.	One very violent shock, followed by others less so. Another shock, last- ing one minute, or, according to some, even two.	..... ..... .....	Accompanied by a noise like distant thunder. The Journal Historique places this event in the middle of November. The windows were shaken violently. Followed, one minute after, by brilliant lightning at Aynho. The day after, the sky appeared the colour of earth.	Phil. Trans. (edit. 1745) vol. x. p. 249; Coll. Acad.
— Nov. 30. In China; in and around Shortly be- Pekin. fore 11 A.M.	Extremely violent. After the first and greatest shock there followed in less than twenty-four hours twenty-three other slighter ones.	.....	The first shock was so violent that buildings were instantaneously thrown down, and in less than a minute 100,000 persons in the city of Pekin alone were buried in the ruins, and still more in the surrounding country, where whole districts were ruined. The earthquake was not everywhere of equal violence in the line of its course, so that some places therein escaped comparatively well, though between others which were ruined.	Du Halde, Description de la Chine, t. i. p. 486; Bertholon in the Journal de Physique, t. xiv. p. 111.
— Dec. 9. Florence About 5 P.M.	A slight shock.....	.....	The same day a luminous cloud was seen, driven with some violence from E. to W., where it dis- appeared below the horizon. This phenomenon is said to have been quite different from an aurora borealis.	Journ. Hist. Fév. 1732, p. 118.

1.	2.	3.	4.	5.	6.
1731. Dec. 23. Island of Lanzarote, one of the Canaries.		The most violent earthquake which had been felt in that island during the two preceding years of eruption.		On the 28th the eruption was renewed, having ceased for about a month. This earthquake and that of June 4, before quoted, are the only ones particularized, but it seems probable, from the account of the eruption, that slight shocks were frequently felt before or during its outbursts.	Buch, quoting Don Andr. Lorenz. Corbeto, curé of Yaiza in this island.
— The town of St. Croix in Morocco.				The town was ruined.....	Vernier, Journal des Voyages, t. xv. p. 50.
1731 or 1732. Felt at Bile. It is said to have extended from Portugal to the Pyrenees.				Bernoulli only says as to date, in a letter of 19th June 1737, "circa ante quinque vel sex annos, hora sexta pomeridiana."	Jean Bernoulli, Œuvres complètes, t. iv. p. 515; Coll. Acad.
1732. Jan. 10. Between 8 and 9 A.M.		A slight shock, which lasted nearly a minute. Half an hour after, a more violent one.		The second shock threw down some old walls.....	Journ. Hist. Mars, 1732, p. 203.
— Feb. 25. Acapulco		Very violent	Accompanied by an extraordinary flux and reflux movement of the sea. It rose 2 or 3 metres above the level of high water, then retired, after being a moment stationary.	Destroyed a large number of the houses	Abel du Petit-Thouars, Voyage de la Vénus, t. ii. p. 212.
— May 21. At Leghorn, in Tuscany, and as far as Genoa. In the afternoon.		Six shocks		The same day a disastrous tempest at Leghorn.....	Journ. Hist. Août, 1732, p. 111.
— Aug. Night between 9 and 10.	Imola, Forli, and Pesara	Three shocks		Some damage done.....	Ditto, Nov. p. 341.
— Sept. 5. Canada. Also felt slightly at Boston, in Pennsylvania, and at Annapolis in Maryland.		A violent earthquake		Some mischief was done at Montreal. At Annapolis a clock was stopped at 11 A.M.	Phil. Trans. vol. 1 p. 13.
— Nov. 1. Naples		One slight shock			Vivenzio quotes "Relazione del terremoto nel dì 29 Novembre

1732. Nov. 29. In the kingdom of Naples, A very violent earthquake. Another shock was felt at Rome the night following.	.....	Buildings were thrown down at Naples. Ariano was almost entirely destroyed. Laurino also was much injured. 1940 persons are said to have been killed and 1455 wounded. On the 9th December Etna was in eruption.	.....	Seyfart, p. 113.
— Dec. 1. Gallipoli on the west coast of the southern part of the province of Otranto.	.....	.....	.....	.....
— Island of Corfu	Rather violent	On the side of Fort the sea appeared to rise up.	Accompanied by a loud noise from the side where the sea seemed to rise up. Followed by disastrous rains.	Mercure de France, Mars, p. 549.
— Strontian in Argyleshire, and all along the western coast of Scotland, though to no great breadth.	.....	.....	.....	Gentleman's Magazine, 1750, p. 56.
1733. Jan. Middle of the month.	Shocks which were very violent at Benevento, and slight at Naples.	About the same time Etna was in eruption .....	.....	Journ. Hist. Avril, 1733, p. 265.
— — 29. In Puglia and Basilicata.	One shock, followed by other slight ones for some time.	Accompanied at Matera by a loud noise in the air.	.....	.....
— March. Naples. Also felt at Ariano.	More slight shocks	Ariano suffered considerably .....	.....	Ditto, Juin, 1733, p. 399.
— Night between 21 and 22.	Three shocks	Stones were thrown from the walls, and at Mayence a bell was made to sound.	.....	.....
— May 18. 2 P.M. Frankfort, Offenbach, Hanau, Giessen, Butzbach, Darmstadt, and Mayence; and all the district enclosed by these places.	.....	.....	.....	.....
— June 14. Annapolis in Maryland, North America.	.....	The day and month of this event do not seem fixed with certainty as the 14th June.	.....	Collection Académique.
— — 23. Pardines in Auvergne...	Several shocks .....	.....	.....	v. Hoff.

1.	2.	3.	4.	5.	6.
1734. Nov. 5 (N. S.) Be- tween 3 and 4 A.M. At Good- chester at Port- smouth, and Chi- chester at 3 ³⁰ or 45 ^m at Havre at Havre and as far other side of the The whole of the of Sunken- Lima in Peru	In Sussex; especially at Be-Havant, Arundel, Gores- were felt, each lasting between 3 and 4 Tarring, Shorcham, 2 or 3 Also felt short interval At Goodwood, &c. Also supposed the di- rection to be E. to W., and in France to be N. to S.	At Havant two shocks were felt, each lasting 2 or 3 secs. and with a short interval between. Some supposed the di- rection to be E. to W., and in France to be N. to S.		The atmosphere was quite calm. The weather became suddenly cold just before. All move- ables were much shaken. The barometer was about 30 in. Horses were observed to be much frightened, and to endeavour to make good their footing.	Phil. Trans. (edit. 1745) vol. x. p. 247; Acad. des Sciences de Paris, 1734, p. 4; Coll. Acad. t. vi. p. 617, and t. vii. p. 103
—	—	Violent			Voyage en Islande, &c. &c.; Huet; v. Hoff.
—	—	Shocks were felt here 3 times during the year.			v. Hoff.
1735. Aug. 7.	Frankfort on the Maine, Mayence, and Cologne.	Several shocks.			Ditto.
—	Oct. 1	Repeated shocks		Accompanied by subterranean noises, and fol- lowed by an eruption of Etna, which did not end until July 1736.	Ferrara, Descriptions, &c. p. 114.
1736. Apr. 23.	Foucouvert (Mau- renne).	Very considerable trembling.			M ^r Alexis Billiet, Notice sur les tremblements de terre de Mau- renne, Mém. de Turin, 2 ^e série, t. ii. Gentleman's Magazine, vol. vi. p. 289.
—	May 1	Two shocks		Accompanied by subterranean noises	
—	June 12.	Rather considerable		Some walls were cracked, and chimneys thrown down.	Coll. Acad.; Jean Ber- noulli, t. iv. p. 615.
—	Through- out the whole of Switzerland, & the coun- try round. Felt at Bâle, Geneva	A single shock			Ditto.
—	Province of Quito; espe- cially the town of Liacacunga.			Liacacunga was much injured. Flashes came forth from a lake near to it.	De la Figure de la terre, p. 74.
—	All the northern part of Sicily; especially Ci- muna, Palermo, and Naso.				Huet, &c. &c.
—	Island of Cyprus	Very violent			v. Hoff.
—	Island of Cephalonia			Did great damage in the northern part of the island. Probably contemporaneous with the earth- quake of Cephalonia	Recherches sur l'histoire de l'Isle de Corfou, vol. v. p. 418.

4 ^h 30 ^m P.M. — 12.	rica. The Bas Valais, and a part of the Pays de Vaud.	Several shocks.....	.....	.....	Bertrand.
— March 3.	Constantinople .....	.....	.....	.....	Gentleman's Magazine, vol. vii. p. 319.
— 5.	Smyrna	Lasted two minutes...	.....	.....	Ditto.
— May 11.	Bâle.....	.....	.....	.....	Jean Bernoulli, <i>loc. cit.</i>
— 12.	Ditto .....	.....	.....	.....	Ditto.
— 11.	Carlsrich (Carlsruhe?) in Swabia.	A considerable shock. Another sudden shock at 2 ^h 30 ^m P.M., lasting about two minutes, and felt with still more violence at Radstadt. At Bâle a very slight one at 3 P.M. Other shocks at Carlsruhe at 10 P.M., and midnight. A violent shock at the time mentioned, and slight tremblings all day. At Bâle a very slight shock at 5 A.M. One violent shock. Another at between 3 and 4 P.M., and again at 5 P.M. A violent shock .....	.....	Accompanied by a noise like distant thunder or the rolling of vehicles. The second shock was the most violent; buildings being much shaken and tables and vessels thrown down. The wea- ther was extremely hot, but the sky was calm and clear.	Jean Bernoulli, t. iv. p. 304; Coll. Acad.
— 12. 3 ^h 45 ^m A.M.	Ditto .....	.....	.....	.....	Ditto.
— 13. 1 ^h 15 ^m P.M.	Ditto .....	.....	.....	.....	Ditto.
— 14. 2 A.M.	Ditto .....	.....	.....	.....	Ditto.
— 15. About 3 ^h 45 ^m A.M.	Ditto	Another violent shock at 5 ^h 45 ^m A.M. fol- lowed by oscillations for three minutes. Two more at 6 ^h 46 and 47 ^m A.M. Another at 8 ^h 20 ^m A.M., follow- ed by tremblings for eight minutes. At 10 A.M. a violent shock, followed by slight tremblings all day.	.....	Walls were cracked. An extremely violent eruption of Vesuvius began this day, & lasted until the 23rd. Many of the shocks were attended with subter- ranean noise.	Ditto.

1.	2.	3.	4.	5.	6.
1737. May 16 5 to 6 ^h 15 ^m A.M.	Carlsruhe (Carlsruhe?) in Swabia.	5 or 6 violent shocks, principally at 5 ^h 37 and 46 ^m . Again at a little after 4 and at 5 P.M. numerous and violent shocks and tremblings. Many shocks and tremblings as before. Again at 8 A.M. and 8 ^h 5 ^m to 8 ^h 20 ^m .		The walls trembled much	Jean Bernoulli, t. iv. p. 304; Coll. Acad.
17. 5 to 6 A.M.	Ditto			The sky, which had hitherto been clear (the wind at S.W.), became obscured; the barometer went down about 4 P.M., and three thunder clouds formed in the W., S.W. and S., about 8 P.M. The sky then cleared again, and at night lightning was seen in the W., and W.S.W. These shocks did some damage. Almost all were accompanied by loud subterranean noises. The heavens were a little cloudy; thunder and rain from 8 to 9 P.M. At 9 ^h 45 ^m P.M. an igneous meteor was seen.	Ditto.
18. 5 to 6 A.M.	Ditto	Several shocks, recur- ring at 9 A.M. At 9 ^h 45 ^m P.M. a terrible earth- quake lasting 3 ^m or 4 ^m . Again at between 10 and 11 P.M. (one at 10 ^h 45 ^m was vertical) and at 11 ^h 45 ^m P.M. Many shocks, but less violent than the form- er. About 3 A.M. a vio- lent trembling. Some minutes before 4 A.M., two vertical shocks. At 6 ^h & rather more than 40 ^m 2 terrible shocks, followed, 1 ^m after, by a third, and continuous tremblings. Between noon and 1 P.M., two more vertical shocks. At 1 P.M. a violent shock from the S.E. At 1 ^h 30 ^m another from the S. At 2 ^h 15 ^m one from S.W. at 3 ^h and		Most of these shocks attended as before with loud subterranean noises. The weather vari- able, and the wind shifting. At about 4 A.M., an aurora borealis, visible notwithstanding the clouds which then obscured the heavens.	
19. The whole of the first hour (from mid- night of the 18th).	Ditto				

21. Ditto 2 A.M.	.....	.....	.....	The barometer very low. Thunder, clouds, and rain.	Ditto.
22. Ditto 1 to 3 (A.M. or P.M.?).	.....	.....	.....	The barometer still very low. The weather wet, windy, and cold.	Ditto.
23. Ditto At noon.	.....	.....	.....	The rain almost continuous. Winds variable	Ditto.
24. Ditto 2 A.M.	.....	.....	.....	Attended with a loud noise. The winds variable and the weather tempestuous. The barometer went up again.	Ditto.
25. Ditto About 6 ^h 45 ^m A.M.	.....	.....	.....	Heavy rain with wind during the night. The sky cloudy. Vortices in the air.	Ditto.
26. Ditto 1 ^h 30 ^m A.M.	.....	.....	.....	During the first shock a whirlwind which agitated the air until daybreak. Also an aurora borealis. At 7 A.M. the barometer had gone up a little. The mountains were covered with fog, and it rained. At 6 P.M. the barometer was much higher. Some lightning was seen. All the shocks of this day were attended with noise.	Ditto.
27. Ditto 2 P.M.	.....	.....	.....	Rain all day and night. The mountains were covered with an extraordinary fog. They absolutely seemed to smoke.	Ditto.

1.	2.	3.	4.	5.	6.
1737. May 28, 2 A.M.	Carlsuwich (Carlsruhe?) in Swabia.	Tremblings for eight or ten minutes.		The weather was hotter than on the preceding days. The barometer went up in an extraordinary way. Rain at intervals. Amongst these shocks at Carlsruhe, 3 (namely, those on May 11, at 2 ^h 30 ^m P.M., May 18, at 9 ^h 45 ^m P.M., and 11 ^h 45 ^m P.M.) were extremely violent, 14 others were rather violent, and the rest were comparatively slight. Throughout the whole time there appears to have been a continuous slight trembling motion going on. During the shocks cocks and hens crowed repeatedly, and appeared much alarmed. On holding one's ear to the ground a noise like that of a vast mass of water in ebullition might be perceived. The earth was warm, and retained its heat even after the weather had become cold. The mountains were covered with thick mists, through which traces of a dim light might be perceived. Globes of fire were seen in the air on the side of Landau on the 18th; they had also been seen there three weeks before. At the same time with these shocks, slight ones were felt at Ulm, where tempests and lightning were almost continuous. A castle was thrown down. At one place the earth opened, and such a quantity of water came forth as to inundate several villages.	Jean Bernoulli, l. iv. p. 304; Coll. Acad.
— Latter end of May or beginning of June. (The authority is "depuis pen.")	Constantinople	Several violent shocks			Mercure de France, Juin, 1737, p. 1175.
— Sept. ...	Near Lopatka in Kamtschatka.				
— Oct. 6.	Kamtschatka, and the Kurile Islands.	Extremely violent	The sea was greatly agitated, overpowered the land to an extraordinary height, and then retired so far that the bottom was visible between the first and second of the Kurile Islands.	Preceded by an eruption of Awatatchinskaja or Gorakaja lasting twenty-four hours. Followed by a terrible eruption of Klutschewskaja, which lasted eight days. Great changes were produced on the surface of the country; many level places were raised into hills, and others sunk into chasms. Near the sea lakes and bays were produced.	Mém. de l'Acad. de St. Pétersbourg, 1833, ii. p. 11. Hoff, Lyell's Principles of Geology, quoting Chapped' Autroche, p. 337.

— Dec. 7. Boston and New York in North America. (O.S.) Shortly before 11 P.M. 1738. Jan. 9. Scarborough in Yorkshire and Taunton (in Somersetshire?). (N.S.)	At New York three shocks were felt during the night.	.....	At New York some chimneys were thrown down.	Phil. Trans. vol. L p. 13.
— Oct. 18. Carpentras (department of Vaucluse) in France. 4 ^h 30 ^m P.M.	Lasted two minutes....	.....	Accompanied by the rising and falling of the ground near a mineral spring which disappeared, but reappeared soon after. Accompanied by a noise like 100 <i>twenty-four pounders</i> being fired at once. The acorns of some oaks fell as thickly as if there had been hail. Two minutes afterwards a rain of earth as if a mine had been sprung. The earth opened. Some chimneys were thrown down.	Ditto, 1741, p. 804; and 1748, p. 398. Hist. de l'Acad. des Sciences de Paris, 1738, Hist. p. 37.
— Oct. or Nov. Nov. 25. Padua 8th hour.	..... Several shocks.....	.....	.....	Phil. Trans. vol. xlix. part i. p. 443.
— Dec. 30. Halifax and other places in the West Riding of Yorkshire.	.....	.....	Appeared as if the earth were suddenly moved in a horizontal direction, and then returned to its former place. Accompanied by vibratory motions, and ending with a kind of hissing noise. Possibly this may only be the same as that of the 9th Jan. wrongly reported as to year, as that event happened on the 29th Dec. 1737 (O.S.). "The Theory and History of Earthquakes" gives the date 30th Dec. 1739.	Toaldo, <i>loc. cit.</i> Gentleman's Magazine, vol. ix. p. 45.
— — — — — 1739. Feb. 13. Foggia in Capitanata. Also felt at Benevento.	Violent..... Ditto Three violent shocks.	.....	..... The city of Meaco much injured Did some damage at Foggia	v. Hoff quotes Kracheninikow. Vivenzio, 1783, p. 34. Journ. Hist. 1739, Mai, p. 360.
— — — — — About 6 A.M. Mar. 24. Smyrna (O.S.)	A slight shock..... Shocks which lasted for a month, but continually decreasing in violence. The motion was horizontal from S. to N., but zigzag like flashes of lightning.	.....	..... An island lying at the entrance of the harbour suddenly sank, leaving only a sandbank.	Ditto. Phil. Trans. 1750, p. 700; Chandler's Travels in Asia Minor, p. 76; Hobhouse's Journey through Albania, p. 614.

1.	2.	3.	4.	5.	6.
1739. April 24. May 4. Different parts of Puglia .. May 4. Valdemone in Sicily ..		One shock .. The shocks recurred for some days (fifteen according to Michele del Bono). There were altogether 60 or even 100 of them.		The town of Nuso was almost entirely ruined. The earth opened and closed again. An eruption of Vulcano in the Lipari islands at the same time. It was remarked that each shock was followed by the noise proceeding from the volcano.	Journ. Hist. 1739, Juillet, p. 39. Ferrara, Campi degli; Bresciak, Institut Géol. (German translation) t. iii. p. 516; Dolomieu, Voyage aux îles Lipari, p. 27.
— 21. Ditto ..		More shocks ..			Ditto.
— June 9. Ditto ..		Ditto ..			Ditto.
— 22. Ditto ..		Ditto ..			Ditto.
or 29.					
— July 23. Batavia in Java ..		A trembling ..			H. Vogel, Beschreibung seiner Reisen (Leipzig, 1797), B. ii. S. 137.
— 1740. Jan. 24. Pekin in China ..		Ten violent shocks ..			Vivienzo, 1783, p. 34; v. Hoff. Pouqueville, Voyage en Grèce, t. v. p. 305.
Between 11 A.M. and noon. France, one of the extinct three or four seconds.					Acad. des Sciences de Paris, 1740, p. 2; Coll. Acad. t. viii. p. 54.
Feb. 15. Ditto ..		Less violent than the last.			Ditto.
2 A.M.					
— 21. Ditto ..		More violent than the last, less so than the first. All these shocks began towards the south.		Preceded and followed by a noise like that of thunder. This noise lasted half a minute, and went from octave to octave (1).	
3 ^h 30 ^m A.M.					
— March 6. Milan, Leghorn, Pisa, Lucca, Massa-Carrara, and as far as Genoa. Barga (Tuscany). Also at Fornacetta and Bugliano.		A violent shock ..			Journ. Hist. Mai, 1740, p. 379.
In the morning.					
12 ^h hour.		A terrible shock which lasted the space of one <i>See Maria</i> . The days following, other shocks, but slight and short.		Great damage was done to buildings at Fornacetta and Bugliano, where three persons perished in the ruins. Probably simultaneous with the last.	— "Notizia inedita," M. Pilla.
— 22. Sciaccia in Sicily ..		Several shocks, recurring up to February ..			Journ. Hist. Oct. 1740, p. 137.

1740. May 22.	Palermo...	One shock .....	.....	.....	Ditto.
— June.	Viterbo and Montefalco	Many shocks .....	.....	.....	Ditto.
Beginning of the month.					
— — — ...	Sciaccia in Sicily	More than 100 shocks (v. Hoffsaystwenty-two) in some days. The most violent on the 25th, which was also felt at Palermo. A violent shock .....	.....	It was remarked that, contrary to the general belief in Sicily, these shocks did not recur after twenty-four or forty hours.	Michele del Bono, <i>loc. cit.</i> ; Ferrara, Campi flegrei.
— Dec.	At Naples	A violent shock .....	.....	.....	Journ. Hist. Mars, 1741, p. 200.
About the beginning of the month.					
1741. Jan. 29.	In the Val-Demone and Val-di-Noto.	Violent trembling .....	.....	.....	Michele del Bono, <i>loc. cit.</i>
— Feb.	Genoa	A violent shock .....	.....	.....	Journ. Hist. Avril, 1741, p. 278.
Night between 7 and 8.					
— April 23.	Padua	One shock .....	.....	.....	Toaldo, <i>loc. cit.</i>
11 ^h 30 ^m (Ital.)					
— Oct. 1.	Sienna	Two violent shocks, followed, during the morning, by eighteen less so. A slight shock .....	.....	Attended with noise. Some damage done to buildings; arches, &c. being thrown down.	Diario del Sig. Silvestro Castinelli.
7 A.M.					
— Dec. 6.	Boston, Roxbury, Dedham, and Walpole in New England.	A slight shock .....	.....	.....	Silliman's Journal, vol. xl. p. 204.
8 A.M.					
1742. Jan. 10.	Leghorn	One slight shock .....	.....	.....	Phil. Trans. 1742; Journ. Hist. 1742, Avril, p. 273; Seyfart, p. 114; Coll. Acad.; communication of M. Pilla to M. Perrey.
— 16.	Ditto. Also felt at Pisa.	Ditto. A quarter of an hour after, one from W. to E. About 4 o'clock more shocks in the same direction. At 10 ^h 30 ^m , two others.	.....	The weather was very warm in the morning, but became cold in the evening. Extraordinary clouds were remarked. The following day, fine rain ending in snow.	Ditto.
A little after 24th hour, Italian time (?)					
— 18.	Leghorn	Slight undulations, scarcely perceptible.	.....	.....	Ditto.

1.	2.	3.	4.	5.	6.
1742. Jan. 19. 12 ^h 30 ^m noon.	Leghorn. Also at Pisa.	Several shocks, all from W. to E.	The shocks at noon were felt by the captain of a Dutch vessel between Cap Corse and Mele. Extraordinary motions were observed off the coast.	Vapours of an extraordinary character were seen at dawn, and remained until two hours before the shocks. The heat then became excessive, and the shocks began with a loud noise. The water in some wells was increased before the shocks.	Phil. Trans. 1742; Journ. Hist. 1742, Avril, p. 273; Seyfert, p. 114; Coll. Acad.; communication of M. Pilla to M. Perrey.
20. Ditto		Several shocks during the day. A violent one at 5 ^h 25 ^m , from (or to?) the S.E., and lasting 10 or 12 sec. More of considerable violence up to the 20th hour of the 21st.		The weather, at the time of the principal shock, was rainy. At night a strange light, which is ill described, was seen; probably an aurora borealis.	Ditto.
25. From the 20th to the 23rd hour.	Leghorn	The ground was in continual agitation during the time mentioned.			Ditto.
26. Ditto		Slight but very numerous shocks.			Ditto.
27. 1 P.M.	Ditto, at Pisa, Genoa, and as far as Laxia near Florence. (According to M. Pilla, from Genoa to Cenna.)	Three terrible shocks, lasting 30 or 32 sec., and ending with a violent gyratory motion. Followed occasionally, up to the 18th March, by slight shocks.		Accompanied by a horrible subterranean noise. The atmosphere brilliant and the air calm. The weather became now very cold. Some buildings were thrown down, and many walls cracked. (Amongst these shocks M. Pilla distinguishes four as having been much more violent than the rest, namely, those of the 16th at 3 ^h , of the 19th at noon, of the 20th at 5 ^h , and of the 27th at 18 ^h . The hours here do not perfectly agree with those given by the other authorities here quoted.)	Ditto.
May 9. 9 ^h 45 ^m A.M.	Lima and Arequipa in Peru.	Lasted nearly a minute. Followed by numerous slight shocks up to the 16th			Ulloa's Travels in South America, in Pinkerton's Voyages and Travels, vol. 2 ^d , p. 590.

1742. May 19. Midnight.	Ditto	.....	Lasted about the same time as the last.	.....	.....	Ditto.
— 27. 3 ^h 35 ^m P.M.	Ditto	.....	One violent shock, lasting nearly two mi- nutes, and ending with slight tremblings.	.....	.....	Ditto.
— June 12. 5 ^h 45 ^m A.M.	Ditto	.....	Lasted one minute ...	.....	On the 15th June Cotopaxi burst into eruption for the first time since 1533.	Ditto.
— Aug. Night be- tween 17 and 18.	Naples	.....	One shock .....	.....	Journ. Hist. Nov. 1742, p. 355.	
— Oct. 14. 9 P.M.	Lima and Arequipa in Peru.	.....	Lasted one minute ...	.....	Ulloa, loc. cit.	
— Nov. ...	Poromusir, one of the Kurile islands.	.....	.....	.....	Kracheninikow in Chappe d'Aute- roche, p. 337.	
—	In Abruzzo .....	.....	.....	.....	Collection Académique.	
—	Malta .....	.....	"A subterranean com- motion."	.....	Gazette de France, 12 Avril, 1776.	
—	Zante .....	.....	One violent shock ...	.....	Montgomery Martin, Hist. of the Brit. Col. vol. v. p. 431.	
1743. Feb. 20. 23rd hour.	Padua .....	.....	One shock .....	.....	Toaldo, loc. cit.	
— March. Beginning of the month.	Province of Otranto; especially at Nardo.	.....	Very violent shocks .	.....	Journ. Hist. 1743, Mai, p. 353; Juin, p. 436.	
— 7. 9 ^h 15 ^m P.M.	Toulouse, Bordeaux, Moissac, Castel-Sar- rezin, and all along the Garonne.	.....	Two shocks with an interval of six mi- nutes.	.....	Mém. des Savants Étrang. t. iv. p. 118.	
— Oct. 8.	Bâle .....	.....	One shock .....	.....	Busspredigt des Pfarrers, A. J. Buxtorf (Basel, 1755, 4to).	
— Nov. 8. Ditto	.....	.....	A very sensible shock	.....	Bertrand; Coll. Acad.	
Between 8 and 9 A.M.	Cephalonia .....	.....	.....	.....	Accompanied by a subterranean humming noise. Probably only the same with the last, the month being mistaken.	
—	Lima and Tarqui in Peru.	.....	Tremblings at these places three times during the year.	.....	Did some damage in the northern part of the island.	
Jan. 1. Near Hernösand	.....	.....	A slight earthquake...	.....	Montg. Martin, loc. cit. vol. v. p. 415. Collection Académique.	
1744.	.....	.....	.....	.....	Acad. des Scien. de Stockholm, 1748.	

1.	2.	3.	4.	5.	6.
1744. Feb. 22. In the kingdom of Naples; especially at Lecce.					Seyffart, p. 114, quotes Genealog. Nachrichten, Th. 59, S. 1013.
— May 16. Between 11 p.m. and midnight.					Mém. de l'Acad. des Sc. 1745, p. 218.
— June 3. 10 ^h 15 ^m a.m.	Cambridge in New England, North America.	A considerable vibration.		Furniture was sensibly agitated.	Phil. Trans. vol. i. p. 14.
— — 13.	In Sicily			The subterranean bellowing noise was very great. The day was bright and hot; the wind (which was light) in the morning W.S.W., in the afternoon N.N.W. The barometer fell on the morning of the earthquake about two lines. The weather was very hot and dry both in the preceding and succeeding parts of the month. There had been no rain since the 23rd May. During the latter part of the month much lightning was observed. Attendant on the commencement of an eruption of Etna which lasted until the following year.	Seyffart, p. 114, quotes Genealog. Nachrichten, Th. 59, S. 1013.
1745. Feb. 7. About 9 a.m.	Christiansand in Norway, and the country round. It extended as far as the sea, and even to the Hellesand fairs. It was felt at Aaserud, and Staden, near Christiansand, and the same day at Copenhagen.	A trembling which lasted two or three minutes.		Accompanied by a loud noise. The houses were shaken, but it was not perceived by persons on foot in the open country or out of the house. It had been very cold on the 5th and 6th, but on the 7th the thaw suddenly came, contrary to all expectation. According to some authorities it appeared to advance 16 leagues per hour, and according to the Acad. de Stockholm it passed from Aaserud to Christiansand (8 or 10 miles) in thirty minutes, and from a place distant 4 miles from Staden to Staden in fifteen minutes. The most of these shocks were felt at night; especially towards morning. They were more violent in the lower than the upper town, and experienced both during complete calm and when the wind was blowing freshly. The writer says that shocks here are more frequent at the equinoxes than at other times, especially during the spring one. Accompanied by a loud noise	Coll. Acad. t. ix. p. 63; Acad. des Sciences de Paris, 1745, p. 15; Richard, Hist. des Météores, t. viii. p. 498; Acad. des Sciences de Stockholm, 1747, p. 253.
— Mar. 18. to June 20.	Smyrna	Twenty slight shocks, of which four were felt between March 18 at 4 p.m. and the following day.			Mémoires de France, Mars, 1746, p. 80.
— July 9. 3 or 4 a.m.	Beziers (department of Hérault) in France. Corfu	Slight trembling. One shock		The government-house, the bishop's palace, and many other houses thrown down.	Acad. des Sciences de Paris, 1746, p. 15; Coll. Acad. t. ix. p. 63. Montg. Martin, Hist. of the Brit. Col. vol. v. p. 327.

1746. Jan. 6. Around Hernösand in Angermannland.	.....	.....	.....	v. Hoff; Acad. des Sciences de Stockholm, 1748, p. 156.
— Feb. 2. Between 9 and 10 P.M.	A slight shock.....	.....	.....	Silliman's Journal, vol. xl. p. 206.
— July 9. Barga in Tuscany	Some slight shocks.....	.....	.....	Relazione giornaliera del tremuoto seguito in Barga l'anno 1746; nel mese di Giuglio, compilata dal dott. F. Tallinuci.
— — 10. Ditto	Ditto .....	.....	.....	Ditto.
— — 11. Ditto	One very violent shock .....	.....	.....	Ditto.
— — 18th hour.	.....	.....	.....	.....
— — 21st hour.	Ditto. Followed by numerous other slight shocks, gradually becoming less violent up to the 23rd.	.....	.....	Ditto.
— — 23. Ditto	An extremely violent shock. The agitation of the ground ceased the next day.	.....	During these shocks the water in the wells was troubled and of a leaden colour. The paleness of the sun was remarked as usual, the uneasiness of animals, &c. Many fish died. The weather was very bad on the 19th; a south wind rendering breathing difficult. Some rocks were shaken down on the 23rd.	Ditto.
— Oct. 28. Lima and Callao in Peru, 10 ^h 30 ^m P.M.	The first shock at the hour mentioned, followed by 200 more in twenty-four hours. The shocks continued at intervals up to the 24th Feb. 1747, during which period 451 were counted.	Callao was ruined by the sea twice retreating, and returning with overwhelming violence, during which it rose 80 feet above its ordinary level. A portion of the coast sank near this, producing a bay. Four other harbours, viz. Cavallos, Guannape, Changay, and Gaura, met with the same fate as Callao.	The valleys of Baranca, Supe and Patavilca suffered greatly. Near Lucannas a mountain opened, and water came forth. The same happened with three mountains of the chain of Convensiones de Caxa Marquillo.	Hist. de l'Acad. des Sciences de Paris, 1746, Hist. p. 24; Bouguer, de la Figure de la Terre, p. 73; Hist. gén. des Voyages, t. xix. p. 311; t. xx. p. 31; v. Humboldt, Voyage, t. i. p. 319.
— — — In the Hant-Valsis	More violent than any shock before felt that year.	.....	.....	Bertrand; Coll. Acad.

1.	2.	3.	4.	5.	6.
1747. May 21. 14 ^h 45 ^m .	Paulua	One shock			Toaldo, <i>loc. cit.</i>
— July 25. 4 P.M.	Bygda in Westerhottin, Sweden.	Tremulous, lasting two minutes, and apparently from S.W. to N.E.		In many places the roofs cracked, and the windows rattled. A clap of thunder was heard while the atmosphere was quite clear, and, an hour after, another like an explosion from a cannon.	Acad. des Sciences de Stockholm, 1750, p. 159.
— Oct. 17.	At sea, on board the vessel <i>Le Prince</i> , Captain Bobrant, going to the West Indies, in lat. 1° 35' S., long 20° 10' W.	One or two shocks were felt as if the vessel had touched the ground.			Dansey in the <i>Comptes Rendus de l'Acad.</i> t. vi. p. 514.
—	Peligno, Noreu, and some other adjoining towns.	A violent shock		Several houses thrown down	Journ. Hist. Juillet, 1747, p. 46.
—	Vence				Seyfert, p. 118; v. Hoff.
—	Toulouse				Ditto.
—	Transylvania				Ditto.
1748. Mar. 12. 11 A.M.	Along the coast of Her- nosand for 10 miles.			Probably this date is according to Old Style, and therefore equivalent to the 23rd N.S. It so it would be simultaneous with the next.	Acad. des Sciences de Stockholm, 1748, p. 154.
— 23. 6 ^h 45 ^m A.M.	In the kingdom of Valencia in Spain.	Tremulous. Lasted two minutes.		Preceded by a dreadful noise, and followed by a very violent west wind.	Journ. Hist. Juillet, 1748, p. 45.
— April 2. 9 ^h 30 ^m P.M.	Ditto. Felt at Valencia, Alcant, Carthagena, Oriuela, San Philippe, Alzira, &c.	As violent as the last, but not so prolonged.		Did some damage at the places particularized	Ditto.
— 18. Between 6 and 7 P.M.	In the neighbourhood of Vevay.	Oneshock, followed by another less violent, a quarter of an hour after.			Bertrand; Coll. Acad.
— July 12. (N.S.) Between 10 and 11 P.M.	Taunton in Somersetshire and the country from the English Channel to the Severn, and extending about the same distance East and West, being felt at the same time at Exeter and Crookhorn.	Direction = S.E. to N.W.		The shock appeared to come from a distance, and was accompanied by a noise like that of a waggon in motion. Those who were sitting felt their seats move under them, and those who were in bed were awakened by a sudden start. China and kitchen utensils were thrown about, and here and there bells were heard to ring.	Phil. Trans. vol. xlv. p. 398; vol. xlv. p. 690.
				v. Hoff mentions two earthquakes at this place, viz. on the 1st July, 1747, and on the 1st or 11th June, 1748. Both dates appear to be erroneous.	

1748.	Madeira	A violent earthquake.	.....	.....	.....	Ditto, vol. xlix. p. 435.
1749. Apr. 22. (N.S.) 5 A.M.	Neufchatel and the neighbourhood.	Followed by several other slight shocks during the day.	.....	.....	The wells became muddy, and moveable utensils clattered against each other.	Gentleman's Magazine, vol. xix. p. 190.
— June 8.	Vienna, and the environs.	A trembling for one minute.	.....	.....	.....	Journ. Hist. Août, 1749, p. 128.
— — 9.	Ditto	Another on this day.	.....	.....	.....	Ditto.
— — 12	Ditto	Ditto .....	.....	.....	These shocks were more violent in the country round than at Vienna itself. At Neustadt a convent was thrown down.	Ditto.
— Oct. 11. 7 P.M.	In France, extending for 60 leagues, from Poitou beyond Luçon to the neighbourhood of Blois.	.....	.....	.....	Accompanied by a noise like the rattling of waggons upon a pavement which lasted a minute and a half. The letter of Reaumur to the Royal Society describing this event is dated 1749, yet it appears almost certain that it should be 1750, and that the earthquake happened in that year. <i>Vid. infra.</i>	Phil. Trans. vol. xli. pp. 689, 691.
—	Olvesbygden in Aarness-Syssel; Iceland.	A very destructive earthquake.	.....	.....	On the 27th March (at night), 23rd Sept. and 25th Nov. according to the Memoirs of the Stockholm Academy, subterranean noises were heard at Bygdea in Sweden. v. Hoff, though quoting from the German translation of the same work, does not mention the last two dates, and says for the first, "Erschütterung zu Bidea in Westerbottn."	v. Hoff.
—	Country around the volcano of Colima in Guadaxara, Mexico.	.....	.....	.....	Ruined Zapotlan. Accompanied by an eruption of the volcano.	Sonneschmidt, Mineralogisch. Beschrieb. der vorzüglichsten Bergwerks Reviere in Mexico, p. 307.
1750. Jan. 28. 2 P.M.	Rome. Also at Frascati and Albano.	An hour after, another slighter shock, and during the night, a third of greater violence. Very sensible shocks	.....	.....	At Frascati and Albano some houses were injured.	Journ. Hist. Mai, 1750, p. 385.
— Feb. 11.	Rome .....	.....	.....	.....	.....	Kant, Géog. Phys. (Italian translation, Milan, 1809) t. iv. p. 312.
— — 19. (N.S.) About 12 ^h 30 ^m noon.	Eltham in Kent, eight miles S.E. from London Bridge.	Two shocks from E. to W.	.....	.....	The wind from the S.W., which had been high the night before and during the morning, had ceased, and for some time after it was quite calm. Some pigeons seemed much frightened. As the time was not minutely observed this event probably did not precede that in London by ten minutes.	Phil. Trans. vol. xlv. Appendix.

1.	2.	3.	4.	5.	6.
1750, Feb 19, 12 ^h 40 ^m noon	London and the country for several miles round, at Tooting, Chelsea, &c., especially violent on both sides of the Thames from Greenwich to Richmond. Also at the same time on the coasts of Normandy at Havre and Boulogne, Picardy and Brittany.	A violent shock	Many vessels in the middle of the Thames felt a violent shock.	Some persons spoke of a former slight shock at London at 7 A.M., and also of one at Plymouth at 1 A.M. on the following day. Both appear to be very doubtful. v. Hoff has obviously copied incorrectly the shocks in England of this year.	Phil. Trans. vol. xvi. Appendix.
— Mar. 10	(anstadt in Swabia ...	A trembling .....	.....	Kaferstein mentions an earthquake at Constance v. Hoff. on the same day, but v. Hoff thinks this name is only mistaken for Canstatt.	Phil. Trans. loc. cit.
— 19	London and some other places in the neighbourhood.	A slight shock .....	.....	.....	Phil. Trans. loc. cit.
(N.S.) Midn ^y (of the 18th)	Ditto	Ditto .....	.....	.....	Ditto.
2 A.M.	Chelsea	Ditto .....	.....	.....	Ditto.
3 A.M.	London, Chesham (Chesham?), Hertford, Croydon, Tooting, Chelsea, Fulham, Epsom and Tulse.	Three or four consecutive shocks in the space of 10 or 12 secs. (or, according to some, only 3 or 4). Direction at London said to be E. to W., in the neighbourhood from N.E. to S.W., or even from N.W. to S.E. Others believed they felt alternate vibrations from N.W. to S.E., and vice versa.	.....	.....	.....
5 ^h 40 ^m A.M.	.....	At Chelsea two figures of porcelain, which had been placed with their faces to the W., were found after the shock turned to N.E.	.....	.....	.....

Ditto.

Ditto.

Ditto.

Phil. Trans. loc. cit.

v. Hoff.

6.

5.

4.

3.

2.

1.

2 A.M.	bourhood.						Ditto.
4 A.M.	Ditto						
	Frascati near Rome.....						Kant, <i>loc. cit.</i>
24.	In the South of France.						Acad. des Sciences de Paris, 1750, p. 36; Mém. des Sav. Étr. t. ii. p. 612; Coll. Acad. t. x. p. 178. Phil. Trans. <i>loc. cit.</i>
25.	East Molesey in Surrey.						
(N.S.) Before 4 A.M.							Ditto.
29.	The Isle of Wight						
(N.S.) Betw ^a 3 and 4 A.M.							
6 P.M.	Ditto, at Portsmouth, Bridport, Southampton, Bath, Northaw, Gubbins, Hatfield (not felt at Hertford), Hackney near London, &c. Also in Jersey and Guernsey.	Direction at Portsmouth (where the shock was but slight) E. to W. Lasted four or five seconds. At Hackney the direction was W. to E.					Accompanied at most of these places by a noise like thunder at a distance. At Hackney, however, no noise was heard. The weather had been alternately wet and fine for a week before; there had been rain before 6 o'clock on the 29th, and a stormy cloud was seen at the moment of the shock. The time given for Portsmouth is 5 ^h 45 ^m or 6 ^h .
April 13. (N.S.) 10 P.M.	Extended from Lancaster to Wrexham in the direction N. to S. and from Flintshire to Stockport and Altringham in that of W. to E.	Rather violent at Chester and Manchester. Slighter at Liverpool, where the motion was undulatory from N.W. to S.E. and lasted two or three secs.					At Barnhill the houses were violently agitated; at Downing in Flintshire a bed upon castors was moved from its place. Accompanied by a noise compared to thunder, wind, &c. The heavens were obscured by a thick mist, in which red rays were observed converging towards a point near the zenith. This appearance lasted fifteen or twenty minutes (aurora borealis?).
Before May 11.	Jamaica	Many shocks					Journ. Hist. 1750, Oct. p. 300 (quoting letters from Jamaica of May 11). Gentleman's Magazine, vol. xx. p. 282.
May 12. (N.S.)	Cerigo	Lasted five minutes.					
5 A.M.	Hammerdal in Jämtland; Sweden. Also in the parishes of Lit and Rödöen, extending 8 miles.	Apparent direction = N.E. to S.W. The shocks more to the South did not take place for half an hour afterwards.					Mém. de l'Acad. de Stockholm, 1750.

1.	2.	3.	4.	5.	6.
1750, May 15 (N.S.) 10 A.M.	Winbourn in Dorset—One violent shock ... share, and the country for 20 miles round.	One violent shock ...	...	Accompanied by a noise like the discharge of artillery.	Phil. Trans. loc. cit.
— 23	In Calabria ... Simultaneously in Cala- bria and at Florence.	Several shocks ... Ditto, repeated on the 25th.	...	Probably only the same with the last ...	Kant, loc. cit. v. Hoff.
— Night between 24 and 25.	Several parts of the South of France, in and about the Pyrenees. Felt at Rodez, Montpelier, Nar- bonne, Toulouse, Medoc, Pons in Saintonge, Ma- caire in Guyenne, Bor- deaux, and for 12 leagues to the West of this last place.	Many very violent shocks, renewed at some places all through the month of June. At Tarbes four shocks were felt from 10 at night to 5 the next morn- ing, and on the 26th, three more.	...	The shocks were most violent in the Pyrenees. Masses of rock were thrown down in the valley of Lavedan. Several houses also were thrown down, and at Tarbes an old tower. Preceded by subterranean murmuring.	Gazette de France, 1750, No. 28; Mém. de l'Acad. de Paris, 1750, p. 36; Mém. des Sav. Etr. t. ii. p. 612; Coll. Acad. t. x. p. 178.
— June 7.	In the Morea and the island of Cerigo.	Very violent ...	...	In the island of Cerigo the town was ruined and more than 2000 persons perished.	Journ. Hist. Sept. 1750, p. 217; Phil. Trans. loc. cit. p. 734.
— 21 to 23.	Tarbes (Hautes Pyrénées.)	Several violent shocks, slight ones having been felt there from the 24th May.	...	...	Mém. de Toulouse, t. ii. H. p. 15.
— 24	Munch and Landshut.	Three shocks at Mu- nich; the first in the evening, the second, more violent, at mid- night, and the third at 1 A.M. the following morning.	...	All the 25th a violent wind, which threw down houses in the open country, and a thunder- storm with hail. The sea overflooded its banks.	Journ. Hist. Sept. 1750, p. 212; v. Hoff.
— Aug. ... (N.S.) 6 ^h 45 ^m A.M.	Gibraltar ... In the counties of Lin- coln and Nottingham. Felt at Spalding, New- ark, Grantham, Stam- ford, and Milton near Peterborough.	One shock ... Ditto	...	Accompanied by noise. The air was quite calm. The same night an aurora borealis was seen at the same places.	v. Hoff. Phil. Trans. loc. cit.
— Oct. 5.	In Jamaica ... A large tract on the north coast of Africa.	Ditto ... A trembling	...	...	v. Hoff. Ditto.

AND 1 P.M.	RUSSAND, AND LINCOLN, in England; extending W. to E. from Warwick to Bury in Suffolk, and N. to S. from Lincoln to Northampton.	THREE OR FOUR, OR, according to others, of twenty seconds.	EARTHQUAKES TO THE agency of electricity, these shocks followed the course of the rivers and canals, which acted as conductors.	HAVING EXPERIENCED these shocks. Accompanied by a loud noise from N.E. to S.W. or vice versa. At Northampton the houses of a street running N. and S. were more shaken on the East side than on the West. Some chimneys were thrown down. The weather was calm and fine. Auroræ boreales had been frequently seen for some time before.	Acad. des Sciences de Paris, 1750, p. 36; Mém. des Sav. Étr. t. iv. p. 118; Coll. Acad. t. x. p. 178.
— About noon.	In Brittany, extending from Cherbourg to Avranches, and as far as Bayeux.	A very slight shock.		Accompanied by a loud detonation. Obviously the same earthquake with that in England.	
— — —	At Naples, and in the Romagna.	Tremblings			Kant, Géog. Phys. loc. cit.; Keferstein.
— — — 16.	In Lapland	One shock			Keferstein.
— — —	In Romania; especially at Philippopoli.		The river Maritza quitted its bed, and inundated the surrounding villages.	Philippopoli was ruined. The Journal Historique does not give the month.	Gentleman's Magazine, vol. xx. p. 478; Journ. Hist. Déc. 1750, p. 466.
— Dec. 22.	Felt at Naples, Venice, and Schaffhausen.	A trembling.			v. Hoff.
— — —	At St. Pölten in Austria.	One shock			Keferstein.
— — —	Lisbon	One violent shock			Phil. Trans. vol. xlix. pt. i. p. 410.
— — —	Luçon, one of the Philippine isles.		Accompanied by a volcanic eruption under a lake, which lasted three months, and by which seven new islands were produced in the lake.		Ditto, pt. ii. p. 458.
1751. Feb. 3.	Jamaica				Keferstein.
— 15.	Nantes in Brittany	A trembling motion.			v. Hoff.
— Mar. 30.	On the banks of the lower Loire.	Ditto			Ditto.
— April	Angers in the department of the Maine and Loire.	Ditto			Ditto.

1.	2.	3.	4.	5.	6.
1751. May 6 Stafluanger in Norway. (N.S.)	Lasted one minute	.....	.....	Gentleman's Magazine, vol. xxi. p. 235.
Between 12 and 1 in night	An account in ditto, same vol.
June 5. In the neighbourhood of Naples, at Rome and Florence.	Several shocks.	.....	.....	v. Hoff, S. ii. B. 331.
July 11. In Sicily	Ditto	.....	.....	Kerstein.
19. At Nocera and Gualdo in the Apennines.	v. Hoff, <i>loc. cit.</i>
26. Ditto, and other places in Umbria. Also at Rome.	Reiterated violent shocks for two hours in Umbria.	.....	.....	Journal Historique, Oct. 1761, p. 308; Kant, Géog. Phys. <i>loc. cit.</i>
Aug. ... Gubbio, somewhere parts of Italy, and at Fa- lermo.	Several shocks.	.....	.....	Kant, <i>loc. cit.</i>
Sept. 15. Among the Antilles especially at St. Do- mingo.	Several shocks. At Martinique they lasted but a short time.	.....	.....	The afternoon had been wet. Lightning in the evening. A little after 11 o'clock the thun- der began.
29. St. Domingo	p. 144-155; Acad. des Sciences, 1752, p. 16; Journ. Hist. Avril, 1752, p. 318.
Oct. 1. Martinique	A slight shock	.....	.....	Ditto.
8. 30 ^m A.M.	Kant, <i>loc. cit.</i>
8. St. Domingo	De Chamvallon, and the other works just quoted.
12. Ditto	Gentleman's Magazine, vol. xli. Ditto.
At noon.
18. Ditto	Two shocks with a very short interval, the motion lasting at least three mi- nutes at each shock.	.....	.....	The weather very fine and perfectly calm; not Ditto. a breath of wind in motion.
2 P.M.
3. 30 ^m P.M.	The earth trembled slightly for two or three seconds.	.....	.....	The barometer did not vary during the earth- quake. The wind was moderate, and the sky clouded.
5 P.M.	Gentleman's Magazine, <i>loc. cit.</i>

1751. Oct. 23. In Naples and towards 17½ (Italian time).	.....	.....	Vesuvius was in eruption from the 19th of this month to the 9th November.	Della Torre, p. 126.
— 27. In Finland .....	.....	.....	The houses trembled. A noise was heard in the air.	Collection Académique, t. xi. p. 14.
— 10 P.M.	.....	.....	.....	Gentleman's Magazine, <i>loc. cit.</i>
— 8 P.M.	.....	.....	.....	Kant, <i>loc. cit.</i>
— Nov. 5. In Finland .....	.....	.....	Shocks again accompanied by noise	Collection Académique, <i>loc. cit.</i>
— 9 A.M.	.....	.....	Possibly confounded with one of those given by the Collection Académique.	Keferstein quoted by v. Hoff.
— 7. Swansky in Finland .....	.....	.....	Again accompanied by noise	Collection Académique, <i>loc. cit.</i>
— 9. In Finland .....	.....	.....	More shocks with noise.....	Ditto.
At night.	.....	.....	.....	.....
From 1 to 7 A.M.	.....	.....	Slight tremblings had been felt almost every day since the 1st.	Gentleman's Magazine, <i>loc. cit.</i>
— 19. St. Domingo .....	.....	.....	Port-au-Prince was completely ruined. A portion of the coast, twenty leagues in length, sank into the sea. Horses, sheep, and oxen by their irregular motions and cries, showed their fear, and birds durst not alight on the ground.	Hist. de l'Acad. de Paris, &c. before quoted, and Gent's Mag. <i>loc. cit.</i>
— 3 ^h 20 ^m P.M.	.....	.....	.....	Gentleman's Magazine, <i>loc. cit.</i>
— 21. Ditto .....	.....	.....	.....	Ditto.
8 A.M. (Per- rey gives the hour 7 ^h 50 ^m.)	.....	.....	.....	.....
— Ditto .....	.....	.....	.....	.....
— 10 A.M.	.....	.....	.....	.....
— 5 P.M.	.....	.....	.....	.....
— Genoa. (Also felt in the country about Milan.)	.....	.....	The sea was so much agitated that vessels were nearly wrecked.	Journ. Hist. Fév. 1752, p. 150; Kant, <i>loc. cit.</i>
— 22. St. Domingo .....	.....	.....	.....	Gentleman's Magazine, <i>loc. cit.</i>
4 and 6 A.M. and 3, 4, 8, and 11 P.M.	.....	.....	.....	.....
— 23. Ditto .....	.....	.....	The shocks were felt on board ships more than 100 leagues from the island, the sensation being as if the ship had struck.	Ditto.
1½ and 5 A.M. and 1½ 45 ^m and 3½ 20 ^m P.M.	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
1751. Nov 24 6 $\frac{1}{2}$, 7 $\frac{1}{2}$, 10, and 11 $\frac{1}{2}$ A.M.	St. Domingo	More shocks			Gentleman's Magazine, <i>loc. cit.</i>
— 23. Ditto .. 6 $\frac{1}{2}$, and 7 $\frac{1}{2}$ A.M. and 2 and 3 P.M.		Ditto			Ditto
— 26. Ditto .. 4 $\frac{1}{2}$, 7 $\frac{1}{2}$, and 8 $\frac{1}{2}$ A.M.		Ditto			Ditto
— 28. Ditto .. 8 $\frac{1}{2}$ A.M.		Two very violent shocks.			Ditto
— 30. Ditto .. 8 $\frac{1}{2}$ A.M.		One violent shock			Ditto
— Dec. 1. Ditto .. 7 P.M.		Described as a quick strong tremor.			Ditto
— — — Genoa ..		Less violent than the shock of the 21st of November.			Journ. Hist. Pér. 1752, p. 150.
— — — 4. Naples ..		A trembling			N. Hoff.
— — — 5. St. Domingo ..					Gentleman's Magazine, <i>loc. cit.</i>
— 2 A.M.		More tremblings.		Accompanied by noise as before	Collection Académique, <i>loc. cit.</i>
— 8 A.M.	11. In Finland ..				Gentleman's Magazine, <i>loc. cit.</i>
— 7 $\frac{1}{2}$ A.M.	12. St. Domingo ..	One slight shock.		This is the last shock the date of which is distinctly specified, but the earth appears to have been trem- bling more or less from the 18th October. During some of the violent shocks before mentioned, the earth opened and threw out hot water, having a fœtid smell. Noises like the explosions of cannon were heard. The weather was generally fine and calm, but each shock was preceded by a rushing noise like a sudden gust of wind.	
— 14 In Finland ..				The same phenomena as before renewed	Collection Académique, <i>loc. cit.</i>
— 7 A.M.	19. Province of Tra-la- Montes in Portugal.	Violent		Many houses were injured at Torre de Moncurvo. Journ. Hist. Mar., 1753, p. 327. Followed by a terrible storm.	
— 25 In Finland ..				Attended with noise as before	Collection Académique, as before.
— 3 P.M.					

1751.	Gap in Dauphiny	A trembling.		.....	Moniteur, 10 Avril, 1808. v. Hoff.
—	At Venice			.....	Schlözer, Neue Erdbeschreibung von America, Th. ii. S. 700.
—	St. Jago di Guatemala.			.....	Mém. des Sav. Étr. t. iv. p. 118.
1752. Jan. 12.	Toulouse and in the Pyrenees.	Two shocks in two minutes.		A noise was heard like that of a forge blown by bellows. Much snow fell during the night.	v. Hoff; Keferstein.
0 ^h 30 ^m A.M.	Frontello, not far from Mantua.	A trembling.		.....	Seyfart, p. 121.
—	Torre de Moncorvo in the province of Trallos-Montes, Portugal.			.....	Ditto, p. 125; v. Hoff.
—	In Chili, at Concepcion, and on the island of Juan Fernandez. Also, according to some accounts, felt at Port-au-Prince in St. Domingo.			Possibly confounded with the St. Domingo earthquake of the year before, though this does not seem probable.	
— Feb. 23.	Dartmoor in Devonshire, and the neighbourhood.			.....	Mrs. Bray's "Borders of the Tamar and Tavy," vol. i. p. 310.
—	Some parts of Sweden, especially at Fahlun and in Dalarne.	A slight trembling, which did not last long.		.....	Seyfart, p. 120.
— Mar. 16.	Stavanger in Norway	A considerable shaking motion.		An unusual light seen in the East.	Ditto, p. 121.
11 P.M.	At the mouths of the Mondego and Vouga, at Aveiro in Portugal.	A violent trembling.		Houses were injured and thrown down	Ditto, p. 122.
—	Bristol and other places in Somersetshire.	A considerable shaking from S. to N.		This account is not found in the English collections of earthquakes.	Ditto, p. 121.
(N.S.) 11 ^h 30 ^m A.M.	Stavanger in Norway	Several violent shocks, lasting several minutes.		The weather was remarkably fine until 2 o'clock, when a small cloud rising extended itself over the heavens, and the whole evening there was a violent storm of wind, hail, and thunder and lightning; followed during the night by the appearance of a strange star of an octagonal shape, which seemed to throw forth balls of fire from its angles (!). Keilhan gives the date the 16th.	Gazette de France, 10 Juin, 1752; Seyfart, p. 122.
April 15.					
4 P.M.					

1.	2.	3.	4.	5.	6.
1752. April 16. In Somersetshire					Kant, Géog. Phys. t. iv. p. 313.
— 28. At Bureos and Aveiro in Portugal.		Violent...	Attended with inundations.		Seyfart, p. 121; Gazette de France, 3 Jun.
— Between May 13 and 3 A.M.				Unaccompanied by damage	Seyfart, p. 122; v. Hoff.
(N.S.) 5 P.M.	Constantinople and	Not very great			Phil. Trans. vol. xlix. Pt. I. p. 116; v. Hoff; Gazette de France, 8 Juillet.
—	At Nocera in Umbria. Those Also at the same time in the Marches of Ancona slight.	More shocks. Those in the Marches of Ancona slight.			
— June. At Zante	cons.	A violent earthquake, lasting two minutes.		Many of the principal streets of the capital were ruined, and one of the highest towers of the castle thrown down.	Seyfart, p. 123; v. Hoff.
the beginning of the month.					
At night	5. At Rocca, Albano and Genzano in the southern part of the States of the Church.	One shock		v. Hoff places at this time the shocks at Nocera, &c. just mentioned. Kant gives the date July for both.	Seyfart, p. 124.
— 22. At Leghorn.		Ditto			Ditto.
July 13. At Urbino, Gubbio, Gualdo, Foligno, and Fabriano.		Ditto			Gazette de France, 19 Août.
At night.					
— 21. At Tivoli		Ditto			Ditto.
3 A.M.					
29. (N.S.) 8 P.M.	Adrianople. Also at the same time at Constantinople and Smyrna.	Very violent at Adrianople and Constantinople, slight at Smyrna. At Constantinople there was a trembling in a perpendicular direction for several seconds, and then three or four regular horizontal shocks from N.W. to S.E., i.e. in the direction of Adrianople.		At Adrianople clefts opened in the earth from which there came out water smelling of sulphur. Mosques and houses were much injured. The wind at Constantinople was in the morning S., in the afternoon E.S.E. and very violent. It remained so during the earthquake.	Phil. Trans. loc. cit.; Gazette de France, 30 Sept., 6 Janv.; Hook, loc. cit.; Journ. Min. 1753, Fév. p. 149; Kant, loc. cit.

Sept. 6.	Spoletto	ring the whole month. A trembling.....	.....	.....	.....	.....	Keferstein. Hist. de l'Acad. de Paris, 1752, p. 16; Coll. Acad. t. xi. p. 55; Gazette de France, 30 Sept. 1752.
—	Riom and Clermont in Auvergne, and the neighbourhood.	A shock, first from N. to S.; then from S. to N.	On the same day a storm at sea.	Accompanied by noise .....	.....	.....
—	9. Rampiz, a village on the Oder.	A trembling motion, lasting scarcely half a minute.	.....	Attended by a storm of lightning and hail .....	.....	.....	Seyfart, p. 125.
—	26. At Frasigli, Marino, Ve- lettri, and also (though but slightly) at Rome.	A trembling.....	.....	.....	.....	.....	Ditto, p. 126.
—	.....	Frequent shocks du- ring the month.	.....	.....	.....	.....	Phil. Trans. &c., quoted under July.
Oct. Be- ginning of the month.	In the duchy of Urbino	Repeated shocks, which lasted until the 9th of Decem- ber following.	.....	.....	.....	.....	Gazette de France, 11 Nov., 6 Janv. suiv.
—	16. Salerno	Tremblings .....	.....	.....	.....	.....	Seyfart, p. 126.
—	19. Velettri	Ditto .....	.....	.....	.....	.....	Ditto.
At night.	.....	Ditto .....	.....	.....	.....	.....	Ditto; Gazette de France, 2 Déc.
—	23. Herculaneum, Torre del Greco, and all along the coast at the foot of Vesuvius.	.....	.....	.....	.....	.....
—	29. Naples	A slight trembling .....	.....	.....	.....	.....	Seyfart, loc. cit.
Nov. 9. 5 ^h 30 ^m A.M.	Constantinople	Ditto. The same felt several times more in the course of the month.	.....	The wind N.E. The weather hot .....	.....	.....	Phil. Trans. loc. cit.; Journ. Hist. loc. cit.
—	10. Hernösand in the Swe- dish province of An- germannland.	.....	.....	.....	.....	.....	Seyfart, p. 127-8.
—	17. Ditto	A second shock .....	.....	.....	.....	.....	Ditto.
—	21. Ditto .....	.....	.....	.....	.....	.....	Keilhau in his memoir on Norwegian earthquakes quotes Gissler.
—	28. Ditto	Lasted one minute .....	.....	Accompanied by a loud noise, brilliant light in the heavens, and an auroral arch.	.....	.....	Ditto.
7 P.M.	Dec. Be- ginning of the month.	Three shocks .....	.....	.....	.....	.....	Seyfart, loc. cit.

1.	2.	3.	4.	5.	6.
1751 Nov. 24 St. Domingo 6 $\frac{1}{2}$, 7 $\frac{1}{2}$, 10, and 11 $\frac{1}{2}$ A.M.	More shocks				Gentleman's Magazine, <i>loc. cit.</i>
25, Ditto 6 $\frac{1}{2}$, and 7 $\frac{1}{2}$ A.M. and 2 and 3 P.M.	Ditto				Ditto
26, Ditto 4 $\frac{1}{2}$, 7 $\frac{1}{2}$, and 8 $\frac{1}{2}$ A.M.	Ditto				Ditto
28, Ditto 8 $\frac{1}{2}$ A.M.	Two very violent shocks				Ditto
30, Ditto 8 $\frac{1}{2}$ A.M.	One violent shock				Ditto
Dec. 1, Ditto 7 P.M.	Described as a quick strong tremor. Less violent than the shock of the 21st of November.				Ditto
Genoa	A trembling				Journ. Hist. P \acute{e} r. 1752, p. 159.
4, Naples					v. Hoff.
5, St. Domingo					Gentleman's Magazine, <i>loc. cit.</i>
2 A.M.	More tremblings				Collection Académique, <i>loc. cit.</i>
8 A.M.					
7 $\frac{1}{2}$ A.M.	One slight shock.				This is the last shock the date of which is distinctly specified, but the earth appears to have been trem- bling more or less from the 18th October. During some of the violent shocks before mentioned, the earth opened and threw out hot water, having a fœtid smell. Noises like the explosions of cannon were heard. The weather was generally fine and calm, but each shock was preceded by a rushing noise like a sudden gust of wind.
14, In Finland					The same phenomena as before renewed. Collection Académique, <i>loc. cit.</i>
7 A.M.					
19, Province of Tra- l-os-Montes in Portugal.	Violent				Many houses were injured at Torre de Moncorvo. Journ. Hist. Mars, 1752, p. 227. Followed by a terrible storm.
25, In Finland					Attended with noise as before. Collection Académique, as before.
3 P.M.					

Gap in Dauphiny At Vence St. Jago de Guatemala.	A trembling. Two shocks in two minutes. A trembling.	Moniteur, 10 April, 1808. v. Hoff. Schlizer, Neue Erdbeberhebung von America, Th. ii. S. 700. Mém. des Sav. Etr. t. iv. p. 116. v. Hoff; Kobertsch. Seyfart, p. 121.
Jan. 12. Toulouse and in the Pyrenees. Frontello, not far from Mantua.	Two shocks in two minutes. A trembling.	A noise was heard like that of a forge blown by bellows. Much snow fell during the night.
Torre de Moncorvo in the province of Trallos-Montes, Portugal. In Chili, at Concepcion, and on the island of Juan Fernandez. Also, according to some accounts, felt at Port-au-Prince in St. Domingo.	Several violent shocks, lasting several minutes.	Possibly confounded with the St. Domingo earthquake of the year before, though this does not seem probable.
Feb. 23. Dartmoor in Devonshire, and the neighbourhood. 26. Some parts of Sweden, especially at Fablin and in Delarna.	A slight trembling, which did not last long. A considerable shaking motion. A violent trembling.	Mrs. Brey's "Borders of the Tamar and Tavy," vol. i. p. 310. Seyfart, p. 120.
Mar. 16. Stavanger in Norway.	A violent trembling.	An unusual light seen in the East. Houses were injured and thrown down.
27. At the mouth of the Mondego and Vouga at Aveiro in Portugal. 31. Bristol and other places in Somersetshire.	A considerable shaking from S. to N.	Ditto, p. 121. Ditto, p. 122. Ditto, p. 121.
April 15. Stavanger in Norway.	Several violent shocks, lasting several minutes.	This account is not found in the English collections of earthquakes. The weather was remarkably fine until 2 o'clock, when a small cloud rising extended itself over the heavens, and the whole evening there was a violent storm of wind, hail, and thunder and lightning; followed during the night by the appearance of a strange star of an octagonal shape, which seemed to throw forth balls of fire from its angles (!). Kellban gives the date the 16th.

1.	2	3.	4.	5.	6.
1752. April 10, in Somersetshire					Kant, Géog. Phys. t. iv. p. 313.
— 28. At Buaros and Aviro in Portugal.		Violent.	Attended with inundations.		Seyfart, p. 121; Gazette de France, 3 Juin.
— May 13. Between 2 and 3 A.M.				Unaccompanied by damage	Seyfart, p. 122; v. Hoff.
(N.S.) 5 P.M.	Constantinople and Adrianople.	Not very great			Phil. Trans. vol. xlix. Pt. i. p. 116; v. Hoff; Gazette de France, Gazette de France, 8 Juillet.
— 26. At Nocera in the Marches of Ancona.		More shocks. Those in the Marches of Ancona slight.			
— June. At Zante		A violent earthquake, lasting two minutes.		Many of the principal streets of the capital were ruined, and one of the highest towers of the castle thrown down.	Seyfart, p. 123; v. Hoff.
the beginning of the month.					
At night	5. At Riccia, Albano and Genzano in the southern part of the States of the Church.	One shock		v. Hoff places at this time the shocks at Nocera, &c. just mentioned. Kant gives the date July for both.	Seyfart, p. 124.
— 22 At Leghorn.		Ditto			Ditto.
July 13. At Urbino, Gubbio, Galdof, Feligno, and Fabriano.		Ditto			Gazette de France, 19 Août.
At night.					
— 21. Tivoli		Ditto			Ditto.
3 A.M.					
— 29. Adrianople. Also at the same time at Constantinople and Smyrna.		Very violent at Adrianople and Constantinople, eight at Smyrna. At Constantinople there was a trembling in a tremulous direction for several seconds, and then three or four regular horizontal shocks from N.W. to S.E., i.e. in the direction of Adrianople.		At Adrianople clefts opened in the earth from which there came out water smelling of sulphur. Mosques and houses were much injured. The wind at Constantinople was in the morning S., in the afternoon E.S.E. and very violent. It remained so during the earthquake.	Phil. Trans. loc. cit.; Gazette de France, 30 Sept., 6 Janv.; Hudé, loc. cit.; Journ. Hist. 1753, Fév. p. 149; Kant, loc. cit.

— Spoleto	ring the whole month.	.....	.....	.....	K. Eferstein.
Sept. 6. Rion and Clermont in A shock, first from N. to S.; then from S. to N.	On the same day a storm at sea.	.....	Accompanied by noise	.....	Hist. de l'Acad. de Paris, 1752, p. 16; Coll. Acad. t. xi. p. 55; Gazette de France, 30 Sept. 1752.
— 9. Rampiz, a village on the Oder.	A trembling motion, lasting scarcely half a minute.	.....	Attended by a storm of lightning and hail	.....	Seyfart, p. 125.
— 26. At Fraulich, Marino, Veletri, and also (though but slightly) at Rome.	A trembling.	.....	.....	.....	Ditto, p. 126.
— Adriaspole	Frequent shocks during the month.	.....	.....	.....	Phil. Trans. &c., quoted under July.
Oct. Be. In the duchy of Urbino	Repeated shocks, which lasted until the 9th of December following.	.....	.....	.....	Gazette de France, 11 Nov. 6 Janr. suiv.
— 16. Salerno	Tremblings	.....	.....	.....	Seyfart, p. 126.
— 19. Veletri	Ditto	.....	.....	.....	Ditto.
— 23. Herculaneum, Torre del Greco, and all along the coast at the foot of Vesuvius.	Ditto	.....	.....	.....	Ditto; Gazette de France, 2 Dec.
— 29. Naples	A slight trembling	.....	.....	.....	Seyfart, loc. cit.
Nov. 9. Constantinople	Ditto. The same felt several times more in the course of the month.	.....	The wind N.E. The weather hot	.....	Phil. Trans. loc. cit.; Journ. Hist. loc. cit.
— 30 th A.M.	.....	.....	.....	.....	Seyfart, p. 127-8.
— 10. Hérnösand in the Swedish province of Aufmannland.	A second shock	.....	.....	.....	Ditto.
— 17. Ditto .....	.....	.....	.....	.....	Keilbau in his memoir on Norwegian earthquakes quotes Giseler.
— 21. Ditto .....	.....	.....	.....	.....	.....
— 28. Ditto	Lasted one minute	.....	Accompanied by a loud noise, brilliant light in the heavens, and an auroral arch.	.....	Ditto.
Dec. Be. Stenna in Tuscany	Three shocks	.....	.....	.....	Seyfart, loc. cit.
— 31. Ding of	.....	.....	.....	.....	.....
— 31. Ding of	.....	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
1752. Dec 6. 4 to 5 A.M.	Angermainland as before.			Accompanied as before by a loud noise. A feeble streak of light appeared in the heavens extending from N.E. to S.W. in the direction of the shock, for 12 or 13 (Swedish?) miles along the coast. Balls of fire seemed to come from it. These shocks were accompanied by subterranean and aerial noises. These latter were heard in some places where the shocks themselves were not felt. The Coll. Acad. mentions four shocks here in November, and others in December, at each time lasting one or two seconds. Direction, <i>as usual</i> , from S.W. to N.E. The author adds that earthquakes are more frequent in the North towards the end of winter.	Kailhan, as before quoted.
Between midnight and 1 A.M.	Ditto				Ditto.
End of the month.	Around Urbino	Tremblings			Seydard, <i>loc. cit.</i>
	In the marches of Ancona, at Nocera, Santogemini, Civitella, &c. Cephalonia	Fresh shocks		Probably coincident with some of the Italian earthquakes already mentioned for this year.	Journ. Hist. Acad., 1752, p. 152.
		Violent shocks		Berghaus considers these shocks as having occurred at the same time with those in Zante, <i>i.e.</i> in the beginning of June.	Montgomery Martin, Hist. of the Brit. Col. vol. v. p. 415.
1753. Feb. Beginning of the month.	At Modena	One shock		A very thick wall was thrown down.	Seydard, p. 128.
March 9 2 ^h 30 ^m P.M. (v. Hoff gives the hour 1 ^h 15 ^m P.M.)	In Piedmont, Savoy, and part of Switzerland—at Turin, Susa, Mont Cenis, the valleys of Lucerne and Perouse, Fenestrelles, Fignerol, Asti, and Geneva.	At Geneva it lasted two minutes.		A large opening appeared in Mont Cenis, from which torrents of water came. Similar ones were observed in the valleys of Lucerne and Perouse. In the mountain a noise like that of cannon was heard. At Geneva a bell sounded loudly.	Gazette de France, 24 Mars, 14 et 21 Avril; Journ. Hist., Mai, 1753, p. 387 et 465; Seydard, <i>loc. cit.</i>
4 P.M.	Turin	Slight tremblings			Seydard, <i>loc. cit.</i> ; v. Hoff.
10. 7 A.M.	Ditto	Ditto. During this day and those following fourteen shocks were felt.			Ditto.

1 st P.M.	the numbers being confounded.	Many buildings damaged	Seyfart, p. 130.
April 22. Pieve, near Perugia in the States of the Church.	Several shocks.	Trembling motions for three hours.	Gazette de France, 23 Juin. Seyfart, loc. cit.
— 26. Santo Gemini day. In some parts of the middle of month.	Daily shocks in the morning and evening.	Another rather violent earthquake.	Gazette de France, 30 Juin. Seyfart, loc. cit.
— 22. Civitella B.	A trembling lasting for twenty seconds.	Not mentioned in the Philosophical Transactions.	Ditto, p. 131.
June 8. Knotsford in the reign 11 12 P.M.	Five shocks	In Switzerland several wells dried up, and did not reappear until after the shocks of 1755.	Vassalli-Randi, Rapport, &c. as before quoted, pp. 27 and 114. Seyfart, loc. cit.
— 9. Turin, extending also to Switzerland.	On the same or following day a storm accompanied by hail was experienced at the same place.	Ditto.	Kant, Géog. Phys. &c., as before, p. 314.
— 15. St. John in the island of Antigua.	Two violent shocks.	Accompanied by a terrible noise	Seyfart, loc. cit. Kant, loc. cit.
— 18. Cagli near Urbino.	Three slight tremblings.	A trembling	Seyfart, p. 132.
July ... Naples	A trembling		r. Hoff.
— ... In different parts of En-gland.			
Sept. 26. Riccio in Tuscany.			
— ... In different parts of En-gland.			
Nov. 14. Genoa			
Dec. 8. Brest in Bretagne			

1.	2.	3.	4.	5.	6.
1753.	In Sweden	Tremblings			Abh. d. Akad. zu Stockholm, 1753, S. 69.
—	St. Domingo			Shocks attended with subterranean noise	Mém. de l'Acad. de Dijon. an. 1793, 2 ^e semestre, p. 37.
1754 Jan 12. 1 ^h 30 ^m P.M.	Verreyppe, 2 leagues from Grenoble.	Some shocks from N. to S.		Accompanied by a noise like that produced by the falling of masses of rock. In a neighbouring village some houses were thrown down.	Gazette de France, 9 Février; Seyfert; Kéferstein.
— Feb. 5. In 20° S. lat., and 23° 10' W. long.			The vessel La Silhouette, Capt. Pintault, felt an extraordinary shock, as if caused by touching a bank.		Dumey's memoir, loc. cit.
— April 19 York in England. Also felt at Forth, Bishopthorpe, Huntingdon, and Hellingston, 2 or 3 miles from York.		A wave-like motion, lasting for three seconds.		Accompanied by a rattling noise like that of a laden waggon on a stone pavement.	Phil. Trans. vol. xlviii. partil. p. 564.
— June 7. Rome, Trivoli, Faenza, Valmontana, in la Pajestrina, and la Rocca.		A violent shock			Gazette de France, 13 Juillet.
— — 12. In the Morea, and island of Mitelin. Also through a great portion of Central Italy and Sicily.				More violent in Greece than in Italy. v. Hoff	Gazette de France, 30 Juillet; Huot, loc. cit.; v. Hoff; Seyfert.
— (N.S.) 18. Rome and the neighbourhood. At bouthood.		Several shocks.			Gentleman's Magazine, vol. xxiv. p. 336.
— July. Smyrna		A very violent earthquake.			Seyfert, p. 132.
Beginning of the month					
— Aug. 18 Island of Amboina		Eighty-five shocks followed between Aug. 18 and Sept. 22.		The earth opened in several places, and water gushed out.	Pinkerton's Collection of Voyages and Travels; Seyfert, p. 393.
— — 19. Padua		One shock			Tosaldi, Essai Météor. p. 270.
— (N.S.) Betw ⁿ 8 and 9 A.M.					Genl's Mag. vol. xxiv. p. 432.

Sept. 2. 16 P.M.	Constantinople. Also, At Constantinople a vertical shock followed by some horizontal oscillations, the whole occupying about thirty seconds. The direction nearly E. to W.	three or four metres above the lowest tides.	In Constantinople much damage was done to the buildings. The shock was there felt more violently in the upper than the lower stories. The city of Siras was ruined, that of Nicomedia much injured. The earthquake was preceded by complete calm. The wind during the day on which it occurred was from E.N.E. to E.	Phil. Trans. vol. xlviii. part ii. p. 819, and vol. xlix. part i. p. 117.
mid- t.	Constantinople	More shocks	Ditto.	Ditto.
3. Ditto	Ditto	Ditto	Ditto.	Ditto.
M. and 13 th P.M.	Ditto	Two rather more violent shocks.	Ditto.	Ditto.
5. Ditto	Ditto	Two more shocks	Ditto.	Ditto.
10 th A.M.	Ditto	Ditto	Followed in the evening at 8 o'clock by thunder, lightning, and hail.	Ditto.
10 th A.M.	Ditto	Ditto	Ditto.	Ditto.
10 th A.M.	Tain in Dauphiny	Two shocks at the hour mentioned.	The Collection Académique gives the dates 9 and 10 November for these shocks, and the third at the same place mentioned below.	Phil. Trans. vol. xlviii. part ii. p. 819, and vol. xlix. part i. p. 117.
10 th P.M.	Constantinople	Another shock	Ditto.	Phil. Trans. loc. cit.
10 th P.M.	Ditto	Ditto	Accompanied by a noise like thunder	Gazette de France, loc. cit.
10 th P.M.	Tain in Dauphiny	Ditto	Ditto.	Gazette de France, loc. cit.

1	2.	3.	4.	5.	6.
1754 Sept 11 Half an hour after mid- night.	Constantinople	Another shock			Phil. Trans. loc. cit.
12. A little before dawn.	In the neighbourhood of Slight tremblings Brieg in the Valais to Villeneuve; and at Son and Bex.				Bertrand; Coll. Acad.
13. 3 A.M.	Constantinople	Another shock		Many persons said they felt slight shocks all through the month. The first appears to have been the only very violent one.	Phil. Trans. loc. cit.
4 P.M.	Neighbourhood of Brieg, Other slight motions. as above.				Bertrand; Coll. Acad.
19 Between noon and 1 P.M.	Ditto	Alternate oscillations from S. to N.		The shocks were more felt in the mountains than in the plains. They were violent enough to damage the bishop's palace at Sion, and to throw down masses of rock in the government of Aigle. A noise like the discharge of nume- rous pieces of artillery was heard, coming as it were from the mountains.	Ditto.
Oct. 6. 8 ^h 45 ^m P.M.	Constantinople	Several undulatory shocks.		Unattended by any noise	Phil. Trans. loc. cit.
7. At noon.	Ditto	A slight trembling			Ditto.
22. Ottaviano near Vesuvius.		A rather violent shock		Vesuvius opened on the 25th, but there was no serious eruption until the 2nd December.	Daloz, M&A. d'Hist. Nat. t. iv. p. 392.
29. Naples and towards Mas- sa-di-Somma.		A considerable trem- bling.			Phil. Trans. loc. cit.
Nov. 4. 10 ^h 19 ^m P.M.	Constantinople	A shock which lasted but a short time.			Ditto.
9 ^h 45 ^m P.M.	Ditto	Another quite percep- tible shock.		v. Hoff calls attention to the fact that this earth- quake, though the shocks continued so long, seems to have produced no atmospheric dis- turbance, the strength and direction of the wind, and height of the barometer continuing pretty constant throughout the whole period.	v. Hoff.
1755. Jan. 12. 7 P.M.	On the north side of Hecla in Iceland. Hermannstadt	One shock		Accompanied by a slight eruption of Hecla	Gazette de France, 9 Mars.

P.M. — 23. P.A.M.	Ditto	Another shock	ions.	are the dates of these shocks at Constantinople are according to <i>Old</i> style. The Gazette de France mentions other shocks on the 14th September, 1734, the 26th September to 2nd October, and the 4th October. These seem doubtful.	Ditto.
Feb. 25.	The island of Metellino in the Archipelago.	A trembling felt du- ring this month.		In March Etna was in eruption	Kefenstein.
— 27. Apr. 10 1 A.M.	Ditto	A violent trembling motion.		A subterranean noise heard, unaccompanied however by any sensible shock. This noise recurred on the two following days.	Kant, <i>loc. cit.</i> p. 314.
—	In Hertfordshire			Large masses of rock were thrown down from the hills, completely shivered into small pieces, and thrown to a great distance. The surface of the ground also was much disturbed, elevations and depressions being formed.	Ditto.
—	About April 7.	Very sensible shocks		No distinct shock mentioned. The hills were shaken, and masses thrown down.	Collection Académique.
— 28.	On the coast of Bothnia	A violent shock			Ditto.
—	Stepney in Middlesex. Also in Brabant, and at several places along the coast of the Medi- terranean.	Shocks were felt at all these places during the month.			Gazette de France, 24 Mai. Edinburgh Encyclopedia, Article Chronology. Kefenstein.
May.	At Viterbo in Italy	Three violent shocks.		The shocks were so violent that processions were formed the same night in order to avert their continuance.	Gazette de France, 4 Juin.
June 7.	In northern Persia, (Iraq), at Tabriz, Kaschan, Ham, Ispe- han, and Tauris.	Very violent shocks.		In Kaschan more than 600 houses were thrown down. Altogether 40,000 persons perished.	Gazette de France, 8 Nov.; Joura. Hist. Déc. p. 462; Seyfiar; Ker Porter's Travels.
Aug. 1.	Stamford in Northamp- tonshire.	One shock			v. Hoff.

1.	2.	3.	4.	5.	6.
1750, Aug. 24. 3 A.M.	Orgaz and Mora in the district of Toledo, Spain. More violent at the latter place.	Several shocks		Accompanied by a noise like thunder	Collection Académique.
5 A.M.	Sept. 2. Rome and the neighbourhood.	A slight earthquake.			Seyfar, p. 140.
At night.	10. Nord-Syssel. (Perry says this is in Denmark. Should it not be Iceland?)	A violent shock			Gazette de France, 18 Janv. 1756; Journ. Hist. Fév. 1756.
11. Ditto		Several more shocks.		The shock at 2 P.M. threw down several buildings. All the following day the water of a little river near was white like milk. Kefenstein says from the 5th to the 27th Sept. v. 1807.	Ditto.
And during all the remainder of the month.	In various places in Iceland.				
Oct. 4.	Orgaz and the neighbourhood.	Slight shocks			Collection Académique.
Between 10 and 11 A.M.					
4 P.M.	Mora in the same district of Toledo.	Another shock.		A great number of strange meteorological phenomena are recorded as having been observed during this month in Spain. Indeed, for some time before the great earthquake of Lisbon, the accounts of halos round the sun and moon, igneous meteors, alterations in well and river water, which generally acquired an offensive odour, besides thunder, lightning, and rain, are to be found from almost all parts of Europe. These phenomena were most remarkable in Spain, where the water in many of the wells was quite troubled, and rats and some species of reptiles came forth as if much terrified. Domestic animals also appeared frightened and uneasy.	Ditto.
1st half of month.	In Lake Ontario in N. America.		No shock is mentioned, but the water repeatedly rose in an unusual way to the height of ten feet.		Phil. Trans. vol. xlix. pt. 2. p. 644.

<p>17. —————</p> <p>at Chambéry.</p> <p>Myrdalen in Iceland ...</p>	<p>from N.E. to S.W.</p> <p>A violent earthquake.</p> <p>Many other shocks</p> <p>were felt during the</p> <p>month.</p>	<p>.....</p>	<p>sounded in the third story.</p> <p>On the 19th Katlegias burst into eruption,</p> <p>which continued until August 1756.</p>	<p>v. Hoff; Gazette de France, 3 Janv. 1756; Journ. Hist. Fév. 1756.</p>
<p>Nov. 1.</p>	<p>THE GREAT EARTHQUAKE OF LISBON.</p> <p>This earthquake, one of the most violent and widely extended on record, produced sensible effects over a space of the earth's surface included between Iceland on the north, Mogador in Morocco on the south, Töplitz in Bohemia on the east, and the West India islands on the west. Actual shocks however were not felt over the whole of this surface; in some places agitation of the water in lakes, canals, &c. being the only sensible effect produced. The centre of disturbance seems to have been situated beneath the Atlantic Ocean a little west of the coast of Portugal. In Portugal itself, and especially in Lisbon, the most terrible destruction took place, partly owing of course to its contiguity to the seat of volcanic action, and partly to the nature of the earth's surface at that place. In order to arrange all the voluminous notices of this earthquake from so many places, they are here taken merely geographically, the times being given just as recorded, without correcting them for longitude. Throughout Portugal the shocks appear to have been from W. to E. The first shock was slight and lasted about one minute (v. Hoff says 6 secs.). The houses in Lisbon were however sensibly shaken by it. Half a minute afterwards, another shock took place much more violent than the former, which lasted eight or ten minutes (?), and two minutes afterwards the third and most violent shock, which appeared to consist of alternate movements in diametrically opposite directions. This was followed by several other much slighter shocks.</p>	<p>.....</p>	<p>On the 19th Katlegias burst into eruption, which continued until August 1756.</p>	<p>v. Hoff; Gazette de France, 3 Janv. 1756; Journ. Hist. Fév. 1756.</p>
<p>Between 9^h 30^m and 9^h 40^m A.M.</p> <p>9^h 30^m</p> <p>9^h 40^m</p>	<p>THE GREAT EARTHQUAKE OF LISBON.</p> <p>This earthquake, one of the most violent and widely extended on record, produced sensible effects over a space of the earth's surface included between Iceland on the north, Mogador in Morocco on the south, Töplitz in Bohemia on the east, and the West India islands on the west. Actual shocks however were not felt over the whole of this surface; in some places agitation of the water in lakes, canals, &c. being the only sensible effect produced. The centre of disturbance seems to have been situated beneath the Atlantic Ocean a little west of the coast of Portugal. In Portugal itself, and especially in Lisbon, the most terrible destruction took place, partly owing of course to its contiguity to the seat of volcanic action, and partly to the nature of the earth's surface at that place. In order to arrange all the voluminous notices of this earthquake from so many places, they are here taken merely geographically, the times being given just as recorded, without correcting them for longitude. Throughout Portugal the shocks appear to have been from W. to E. The first shock was slight and lasted about one minute (v. Hoff says 6 secs.). The houses in Lisbon were however sensibly shaken by it. Half a minute afterwards, another shock took place much more violent than the former, which lasted eight or ten minutes (?), and two minutes afterwards the third and most violent shock, which appeared to consist of alternate movements in diametrically opposite directions. This was followed by several other much slighter shocks.</p>	<p>.....</p>	<p>On the 19th Katlegias burst into eruption, which continued until August 1756.</p>	<p>v. Hoff; Gazette de France, 3 Janv. 1756; Journ. Hist. Fév. 1756.</p>
<p>In Spain the earthquake</p>	<p>At Gibraltar a violent</p>	<p>The sea rose at Gibralt</p>	<p>Seville, St. Lucar, and Xeres were greatly injured.</p>	<p>.....</p>

1.	2.	3.	4.	5.	6.
10 ^h 10 ^m	was very violent at Gibraltar. The shock was strongly felt at Cadiz. At Madrid the shock was not quite so great. At Grenada, at the Escorial, at Cordova, at Seville, and throughout all the rest of Spain, with the exception of Barcelona and all Catalonia, as also certain districts in the kingdom of Valencia and Arragon, the shocks were felt with more or less violence.	trembling for 23 (or 30) secs., and then a weaker lasting three minutes with wave-like oscillations. At Cadiz the shock lasted three minutes with violence, and continued, though decreasing, for six or seven minutes. At Madrid two slight shocks were first felt, and then several violent ones. Their direction appeared to be from S. to N., and they lasted altogether five minutes. At Cordova the motion lasted nine minutes with violence; the second shock lasted 24 secs. At Seville they lasted eight minutes.	var 7 feet higher than usual, and a quarter of an hour after fell extraordinarily low. This ebbing and flowing lasted from one quarter of an hour to another, but constantly becoming weaker, until the following morning. At Cadiz the sea came in with overwhelming violence at 11 ^h 10 ^m , inundating the town, and causing considerable loss of life. It tore away the rampart for 100 toises in length. The sea came in again at 11 ^h 30 ^m —11 ^h 50 ^m —12 ^h 30 ^m —1 ^h 10 ^m —1 ^h 50 ^m ; constantly decreasing in force.	Conil was completely destroyed. The town of Compostella in Galicia suffered but little. At Cadiz only three or four old houses were thrown down. At Madrid the water in the wells rose several fathoms a little after the shocks. The houses there were much shaken, but nothing fell but two crosses from the summits of the churches. A cleft opened in one place in a mountain, from which an exhalation destructive to cattle issued. Rota, Malaga, Chiclana, Medina, &c. &c. were more or less injured. Birds and quadrupeds exhibited decided symptoms of fear. Numerous meteors and other unusual atmospheric phenomena are stated to have been observed about this time in Spain and Portugal.	
About 10 ^h ...	In Africa the northern portion experienced the shock with nearly as much force as Portugal. At Ceuta the shocks continued for some days. At Algiers also they were very violent.	At Tetuan three shocks were felt in seven or eight minutes. In Tangier they lasted longer. At Ceuta the first shock lasted about 30 secs. It was followed by alight ones for three minutes.	At Tetuan the water of the river Chico was coloured red. In Fez houses and part of a neighbouring hull were thrown down. Water was also coloured red here, probably by ochreous mud. At Salle many houses fell. So also at Mequinez, Safé, and Morocco. Near the latter place a mountain opened, and swallowed up a village with 8000 or 10,000 people. Opposite the port of Mogador, some rocks sank suddenly, so that the water, before shallow, became twenty fathoms deep. At Ceuta the points of a mountain appeared to rise and fall.		
10 ^h 10 ^m			Oran similar phenomenon took place.		

<p>The south and west of France experienced these shocks, and even in Poitou, Bretagne, and Normandy they were felt. At Caen they were violent.</p>	<p>At Bordeaux there was but a slight rumour was greatly agitated at Bordeaux.</p>	<p>The water of the Garonne was greatly agitated at Bordeaux.</p>	<p>Toulouse, Anduze in Languedoc, Angoulême, Cognac en Saintonge, and Bordeaux are mentioned as places where the shock was felt. The waters appeared to boil, and changed colour. This was also observed in Provence, at Cuers, Vauluse, Gémenos, and St. Auban. At Angoulême subterranean noises were heard, and a cleft opened in the earth.</p>	<p>In the subterranean mill near Locle, which lies nearly 300 feet deep, a terrific underground noise was heard. At the lake of Zurich a low noise was heard, as also at the little lake of Sedorf, where the noise appeared not merely in the air, but under the water. The <i>maximum</i> height of the barometer at Berne for this day was 26 in. 11 lines; the <i>minimum</i> at the same place was 25 in. 5 lines. At Bale it was as low as 26 in. 2 lines, the mean being 27 in. The thermometer at Berne was at 6 A.M. 2°·5 below zero of Reaumur; towards evening it rose to 2° above zero.</p>
<p>In Switzerland some shocks were felt in the Valais, especially at Brieg and the neighbourhood. Also near Viège. The neighbourhood of Neuchâtel, as indeed almost all Switzerland, was more or less shaken.</p>	<p>The shocks here do not seem to have been so distinct as further west, but that the earth was sensibly shaken there can be no doubt. Between 3 and 4 P.M. shocks were felt at Bale, and during the night two shocks at Locle.</p>	<p>Between 9 and 10 the Lake of Geneva retired three times from its eastern shore, while at the western nothing unusual was perceived. A vessel upon it appeared struck suddenly. Very many wells in different places were troubled and rose to unusual heights. The lakes of Thun, Brienz, Neuchâtel, Evallere, Constance, and Zurich, were also disturbed. The last rose from 6 to 10 and up to 12 feet. The course of the river Aar appeared for a moment retarded. A sulphurous and bituminous well near Kilchberg flowed in greater quantity than usual, and was troubled. The Rhine near Constance appeared to stop and rise for some moments.</p>	<p>On the lake at Salzwedel, At Augsburg magnets let the weights suspended</p>	

	2.	3.	4.	5.	6.
	were felt in many places in Swabia, as at Cannstadt, Augsburg, and Dona worth. At Toplitz in Bohemia a strong shock.	very violent in Central Europe, the effects of the earthquake being principally manifested on the lakes and other pieces of water.	gen at the S.W. extremity of the Thüringer Wald, extraordinary movements were observed, during the night preceding the earthquake (v. Hoff thinks this account doubtful) In the lakes of Templin, Netza, Mühlgrast, Roddelin, and Labeeze, and those of the Markgrate of Brandenburg disturbances were also observed. So also at the lakes of Salzbürg, and the Walchensee. The Elbe was agitated at Hamburg at 1 P.M., at Glückstadt between 11 and 12 noon.	to them fall, and there, as at many other places, the magnetic needle was disturbed. At Donau-wörth some walls were shattered. At Ingolstadt the wells dried up, and afterwards gave forth turbid water for some minutes. At Toplitz in Bohemia the principal spring suddenly threw forth such a quantity of water that in half an hour the baths overflowed. Half an hour before this the water was very muddy. It then remained quite dry for nearly a minute, and then burst forth with great violence, carrying with it a great quantity of red ochre. It then became quiet as usual, but afterwards yielded more water than before. At Hamburg the channels were seen to move in the churches.	
11 ^h 30 ^m (Milan time).	In Milan in Italy was slightly shaken. At Abbinogressio 8 leagues N.N.W. of Turin the shock was also slightly felt. Central and Southern Italy experienced nothing.	The actual shocks were slight, and are only mentioned as having been felt at these two places.	The waters of the Lago Maggiore rose and sank suddenly.	At Milan the lamps swung of their own accord in the churches, the water was thrown out from the canals upon the banks, and vessels full of liquid flowed over. At Abbinogressio the doors and windows opened and shut with violence, and the water of a canal returned towards its source, and then resumed its course with impetuosity. The smoke which had been coming from Vesuvius for some time before, at the moment of the earthquake, sank back into the crater, and disappeared.	
	In Holland actual shocks were felt at the Hague and Rotterdam.	.....	At the Hague the water was seen suddenly agitated in a remarkable manner, the ships	At the Hague and Rotterdam bodies which were suspended were seen to oscillate. The canals were affected far inland.	

<p>being quite calm. This occurred simultaneously at the Hague, Leyden, Harlem, Amsterdam, Gouda, Utrecht, Rotterdam, and Boisselle. The motions appear to have been least violent at the Hague. According to one account this took place at 11 o'clock. Another letter mentions 10½ and 11, as if it occurred twice. All along the coasts of Holland and Friesland the sea was much agitated. Vessels were dashed together by it, and moorings broken.</p>	<p>The wells and springs rose so as nearly to inundate the land in some places.</p>	<p>At Christiansand a noise was heard like that of a great wave, and then a shock felt which shook the furniture of the houses. In Gotha-These large trees were uprooted and thrown down. At the lakes of Frizem and Storm Leed the earth sank suddenly and then rose again.</p>
<p>Tremblings were felt in Several shocks were felt at these places.</p>	<p>In this country the waters appeared to boil in many places. They were also agitated and a bellowing noise heard at Alingsaske, Wenersborg, on the lake of Mjörn near Gottensborg, and in some rivers, especially the Eider and Sturh.</p>	<p>The shock was violently felt on board a ship 17 miles south of Cape Lindanæs, everything appearing calm again in a few</p>
<p>In Sweden and Norway At Christiansand the this earthquake was shock was felt at distinctly perceived. In 4 a.m. (This must either be a mistake as to time, or the it is stated to have been felt, on the authority of</p>	<p>Densmark at Ransburg, Elmshorn, Bramstedt, Kellinghusen, and Meldorf.</p>	<p>shock must have been</p>

1.	2.	3.	4.	5.	6.
	<p>the Collection Académique. v. Hoff thinks the accounts from both these places doubtful.</p>	<p>a different one from that at Lisbon.) In Iceland, according to the Collection Académique, the shocks continued for three days in the district of Myrdahl.</p>	<p>minutes. The lake of Dybeyond, 3 miles from Christiansund, was swollen with a loud noise, and inundated its banks. The lake Tarevand did so likewise, and threw out wood which had been imbedded in its bottom. The lake Orevand, the waters at Skie and Laurvig in Tellemarken, and the lake Femundsoe were much agitated. The lake Wenner, and those near Gothenburg, in Dalecarlia and Vermeland, suffered similar disturbances. At the lakes of Prittem and Stora Leed the water rose suddenly.</p>	<p>with a loud noise. In Iceland many houses are said to have been thrown down. The volcano of Katlegas was in violent eruption at the time.</p>	
<p>In the <i>British Isles</i> actually sensible shocks were felt in but few places, the earthquake being principally remarkable from its effects upon the sea round the coast, the lakes, and ponds. Only four places are mentioned as localities where the earth actually shook, viz. Cork in Ireland, Eym-Edge</p>	<p>At Cork a strong shock was felt at the time mentioned. At Eym-Edge four violent shocks were felt in a space of 20 minutes. Near Reading the earth shook for 50 seconds. At Caversham it lasted 1 minute.</p>	<p>At Cork the sea was much agitated. At 10 o'clock, the sea rose 12 to 18 inches at various places on the Frith of Forth, in the neighbourhood of Leith in three or four minutes. At Yarmouth the sea rose to the height of 6 feet a little before noon. At Gainsborough</p>	<p>At Eym-Edge the shocks were felt in the Derbyshire mines at a depth of 60 fathoms, and at the surface. They were accompanied by a loud noise in the interior of the earth. Pieces of rock were detached and fell in the galleries of the mines. Some days after a long fissure was observed in the ground in this locality. The waters of a pond near Reading appeared to boil, and were raised over their banks to the extent of 20 inches above their usual level. At Caversham a noise was heard as if the house were falling, and a vine trained against the building was broken. Two trees also were</p>		

9 A.M.
About 11.

in Derbyshire, a place near Reading in Berkshire, and Caversham in Oxfordshire, one mile from Reading. At Cranbrook in Kent also some people believed that they felt the earth tremble.

rough it attained the same height and receded to its level in 1 or 2 minutes. The same thing was observed at the same time at Hull. At Hancaton several people were in great danger from the rapidity of the motion of the water. At 10^h 35^m at Portsmouth the agitation of the sea was so great that 70 and 86 gun-ships rolled to the extent of 3 feet. The water rose, after 9 o'clock at Dartmouth, above the level of the highest tides, and retained this height for three-quarters of an hour. At Plymouth about 4 P.M. (the time of high water) the sea retired and then came back in 8 minutes, in each case to the extent of 6 feet. The ebbing and flowing continued for some time. At Mount's Bay the flux and reflux, which began about 2 P.M., was very violent and of about the same height. It lasted five hours. At Penzance

injured. At Cranbrook in Kent the water in some fish-ponds rose upon one bank, then retired, and rose on the opposite bank. At Busbridge, near Godalming in Surrey, at 10^h 30^m, the water rose 20 inches above its former level in a canal (running from W. to E.) of 700 feet long by 58 feet wide and 3 to 10 feet deep. The fluctuations lasted about a quarter of an hour, and were attended by a loud noise, sand also being thrown up in great quantity from the bottom. The channel which fed this canal rose towards its source, leaving 36 feet of ground dry. At Lee in the parish of Whitley, at Cobham near Guildford (where at 10 o'clock oscillations of the water from S. to N. and then from N. to S. were very distinct), at Medhurst in Sussex, at Tunbridge Town and Eaton Bridge, two places near Chevening in Kent, in the Thames at Rotherhithe (at between 11 and 12), near London at Peartree Pool (between 10 and 11), at Rochford in Essex (at the same time as the shock at Lisbon), at Barley Court near Reading, at Shireburn Castle in Oxfordshire, at four places in Hertfordshire, near Durham, on Windermere and others of the Cumberland lakes, on Loch Lomond, Ness, Long, and Katrine in Scotland, and other pieces of water throughout the two kingdoms, similar phenomena were observed. See the more minute account of them in the Philosophical Transactions.

1.	2.	3.	4.	5.	6.
<p>9½ A.M. (Funchal time = about 10 A.M. Lisbon time).</p>	<p>Over the surface of the Atlantic Ocean the disturbance seems to have extended widely, as far as the necessarily limited observations go. At Funchal in the south of Madeira, the shock was strongly felt.</p>	<p>At Funchal the shock was violent, from E. to W., and consisted of two epochs of undulation, the first being much the more violent. The whole lasted 1 minute.</p>	<p>it began at 2^h 45^m, lasted but 3 hours, and attained the height of 8 feet. At Newlyn and Monasterehole, on the same coast, the phenomena were almost identical. This strange tide was also remarked at St. Ives, Hayle, and Swansea, at the last place about 6^h 45^m. At Kinsale in Ireland the water came over the quay with such violence as to throw many people down. At 9½ 45^m a Dutch vessel, a league and a half off Monte Zizambre (for 7 leagues from Setuval) experienced a violent shock. Some more shocks were felt on board the same vessel towards sunset v. Hoff mentions the shock as felt by a ship 30 leagues west of Lisbon. Several other vessels appear to have experienced it in various regions of the Atlantic. At 11½ 45^m at the island of Madeira the sea suddenly retired.</p>	<p>The crew of the Dutch vessel mentioned saw the effect of the shock on Monte Zizambre itself, large masses of rock being detached and rolled into the sea. Towards night a mass of smoke (observed also at Colares) was seen in the E.N.E., 7 or 8 leagues from where they were, and afterwards a fire, the light of which was seen all night. (This probably proceeded from one of the towns ruined and on fire.) At Funchal the shock was preceded by a dull noise like that of carriages, which lasted some seconds after the shocks. The doors and windows vibrated quickly.</p>	

(though the weather was perfectly calm) to the extent of 100 paces, and then suddenly returned to the height of 15 feet above the highest rides, inundating Funchal, and doing a great deal of damage on the north and east coast of the island, on the west scarcely anything being perceived. This ebbing and flowing occurred four or five times more, to a less height each time.

On the coasts of Antigua, Barbadoes, Martinique, and Saba, about 3 p.m. (true time there, = about 7 p.m. Lisbon time), the waters of the Atlantic were much disturbed. At Martinique the water rose like a wave to the upper stories of the houses, and in ebbing again left an English mile of ground dry. At Barbadoes it rose 5 or 6 feet, and ebbed and flowed every 5 minutes for three hours, the water being as black as ink (probably from mud).

Less than ten hours after the earthquake in Lisbon, its effects were remarked in the *West Indies* by the motion of the waters of the ocean. v. Humboldt (Voyage, t. v. p. 12) says that the shock was felt at Martinique.

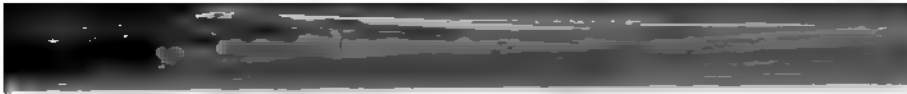
1.	2.	3.	4.	5.	6.
1753. Nov. 2. Lisbon. Also on the same day at Bâle.		The shocks of the day before continued at Lisbon. One shock felt at Bâle.	The movement recurred 64 times from 2 to 10 p.m. The Tagus became dry for some time.		Authors quoted above for the Lisbon earthquake. For that at Bâle, a communication from M. Ch. Mar-tius to M. Perrey (see the memoir of the latter on earthquakes in the basin of the Rhine). Phil. Trans.; Coll. Acad. &c. &c., as above.
— 3. At Lisbon again		At Lisbon the shocks continued.			
7 A.M. At Gibraltar		At Gibraltar a rather violent shock of from 5 to 6 secs.			
Ditto At Ceuta in Africa.		At Ceuta ditto; lasted a very short time.			
		In the island of Sumatra, at Manna, fifty English miles south of Fort Marlborough.		The shocks mentioned as occurring later than the 3rd December injured Cumberland House, Salop House, Layo, and Manna. Near the mouth of the river at Bencoolen the earth opened, and threw out subterraneous water. Poble Point and many villages around Manna were destroyed.	Phil. Trans. vol. I. pt. 2. p. 491.
10 ^h 30 ^m A.M.	4. Madrid, the Escurial, in Andalusia, and almost the whole of Spain, Catalonia excepted.	At Madrid, the Escurial, in Andalusia, and almost the whole of Spain, Catalonia excepted.			Collection Académique.
2 P.M. At Gibraltar.		At Gibraltar the shock at 2 p.m. was slight. The shocks were feeble at Lisbon.			
5 ^m P.M. At Gibraltar.		At Gibraltar the shock was more violent.	At 11 p.m. of this day the sea rose a yard	From the 6th to the 16th the shocks were almost incessant about Gibraltar.	Ditto.

	EVEN AT CONSIDERABLE DISTANCE		
10v. 7. Clermont in Auvergne and then in the neighbourhood of Lisbon.	Two rather smart shocks.	On this day a shock is said to have been felt at sea, 60 leagues from the coast of Portugal, as great as that of the 1st.	Ditto.
11. — 8. Lisbon.	At Lisbon the shock lasted but a short time. There and at Seville the shock was violent.	On this day a shock is said to have been felt at sea, 60 leagues from the coast of Portugal, as great as that of the 1st.	At Lisbon some houses which had resisted the former shocks were thrown down. At Seville also the cathedral was shaken, and some other buildings injured. From the 8th to the 16th no shocks are mentioned as felt at Lisbon.
12. — 14. Brie in the Valais.	A trembling lasting one minute.	The sea rose prodigiously.	An opening appeared in a mountain near, from which water came out in large quantity.
13. — 16. Lisbon.	Renewed disturbance.	The sea rose prodigiously.	The earth seemed to rise and fall like a ship ...
14. — 17. At Gibraltar.	At Irton in Cumberland violent shocks.		In Herefordshire houses are said to have been thrown down.
15. — 18. In New England, especially in the provinces of Massachusetts and New Hampshire.	Two violent undulatory shocks, of which the second was the slightest, followed rapidly upon each other. A tree of 30 feet high bent 10 feet and was felt in New York, Philadelphia, Chesapeake Bay in Maryland, at Annapolis Royal, in New Scotland, at Halifax, at Lake St. George to the west. Its total extent	A ship in the Atlantic Ocean 70 leagues east of Cape Anne experienced this earthquake. A remarkable ebbing and flowing of the sea at St. Martin's Harbour in the West Indies was supposed to be connected with this disturbance. The water was much agitated	Preceded by about a minute by explosions like distant thunder. At Boston the windows and furniture were much agitated. About 100 chimneys were thrown down. An eruption was reported to have taken place at Seignate 20 or 30 miles south of Boston. At Annapolis some chimneys were also thrown down.

1.	2.	3.	4.	5.	6.
	tion seems to have been about 800 miles from N. E. to S. W., by 550 from E. to W., the centre being in 43° N. lat.	tion gradually decreasing for two min. (The whole three lasted four min.) At 5 ^h 29 ^m another slight trembling was felt. The direction of the motion was from N. W. to S. E. (At New York W. to E.) At Fez and Mequinez the shocks were very violent, and continued until the following day.	in the harbours of North America, and quantities of dead fish were observed.		
1755, Nov. 18. In the morning.	At Fez and Mequinez in Morocco.	At Fez and Mequinez the shocks were very violent, and continued until the following day.			Phil. Trans. vol. lxx. pp. 421 and 422; Coll. Acad. p. 634.
Hour not mentioned.	At Lisbon. Also at Agropendente and della Grotta, one and on the borders of the Rhine and in the shock. Along the Rhine slight shocks. At Glossem, Rhine also in Herefordshire. At Aix they were also and at Aix in Savoy. Inconsiderable.	At Lisbon shocks equal to those of the Grotta near Rome; 8th. At Agropendente and on the borders of the Rhine and in the shock. Along the Rhine slight shocks. At Glossem, Rhine also in Herefordshire. At Aix they were also and at Aix in Savoy. Inconsiderable.		At Lisbon twenty-two shocks were counted from the 1st to the 18th.	Phil. Trans. vol. lxx. pp. 421 and 422; Coll. Acad. p. 634.
About 10 p.m.	Tangier and Tetuan on the North coast of Africa.	Violent shocks for four minutes.		Both places were much injured.	Phil. Trans. loc. cit.
19. 10 ^h 30 ^m A.M.	Mequinez in Morocco. Along the Rhine, in the Brigau, and at Aix in Savoy the slight shocks continued.	A very strong shock. Exceedingly violent.		Accompanied by a tempest. But little damaged. Mequinez was completely ruined with two Arab encampments of 25,000 or 30,000 persons.	Phil. Trans. loc. cit. and the Coll. Acad. and other authorities quoted above.
Hour not given.	Tangier and Tetuan	More shocks. They recurred several times during the day, especially at 5 and 9 A.M., and at noon, but feebler than before.			Phil. Trans. loc. cit.
9 A.M.					

or 21. Colares near Lisbon	Two shocks				Phil. Trans. vol. xlii. p. 413.
— 22. Boston in New England	Another shock				Silliman's Journal, vol. xi. p. 206.
— 23. Colares again	Five shocks felt in the time mentioned.			On the 24th the same meteorological indications were observed as on the 31st of October, the day before the great earthquake.	Phil. Trans. &c. as before.
— 24. Sédun, Mézières, Charleville, Liège, and many other localities in Belgium.	Several slight shocks.				Ditto.
— 25. Cordova, and apparently all along the south coast of Spain.					Ditto.
— 26. At Malaga				About this time unusual movements of the waters of the ocean were still observed.	Ditto.
Dec. 9. At Lisbon	The most violent shock which had been felt at Lisbon since the 1st of November.				
— Throughout Switzerland and parts of France, Bavaria, Swabia, the Tyrol, the Italian Alps, and even north of Bavaria. Amongst the places where this earthquake was felt were Turin, Milan, through Piedmont, and Savoy, and as far as Naples, Brieg in the Valais, throughout the whole chain of the Alps and of Jura, at Chiavenna,	At Turin one shock lasting from 4 to 6 seconds, in the direction S. to N., and some minutes after a slighter shake of 2 seconds' duration in the same direction. At Brieg at 2 o'clock a subterranean explosion was heard, and soon after slight movements were perceived, at 2½ stronger, and at 2½			Many of the small lakes of Switzerland were agitated, though not nearly so much as on the 1st of November. The Rhine also was ruffled as by a moderate wind. The lakes, rivers, and springs were most unusually full and swollen, so that terrible inundations were the consequence in several	At Milan the water came in larger quantity than usual from the wells. Some damage was also done to buildings. At Brieg and throughout the Valais chimneys were thrown down, and all the buildings much shaken. The arches of some churches fell. The earth too opened here in many places in the direction S. to N. (that of the shock); some of these fissures threw out water to the distance of several feet, and others closed again themselves. Springs also dried up. Brieg, Glina, and Natria were much injured. On a mountain, 2½ miles from Brieg, the earth sank 1 inch daily from this date till the 26th February 1756. From the 9th until the 21st December slight shocks were

1.	2.	3.	4.	5.	6.
2 ^h 32 ^m 2 ^h 32 ^m 2 ^h 45 ^m 2 ^h 45 ^m	at Aigle, on the banks of the lake of Geneva, in the Cantons of Freiburg, Berne, Lucerne, Aarau, Zug, Zürich, Schwyz, Glarus, Appenzel, Thurgau, Schaffhausen, Basel, Neuchâtel, and in Franche Comté. Also at Mulhouse, Besançon, Bourg, and in the Lyonnais. In the Tyrol, and at Munich, Ingolstadt, Donauwörth, Augsburg and Nestembach.	a very violent earthquake, which was felt all through the Valais. These shocks recurred at intervals of half an hour, but with diminished intensity. Three principal shocks were everywhere felt. At Berne these lasted altogether one-third or half a minute. At Lucerne a slight shock had been felt at 1 ^h 30 ^m P.M., and at Nestembach one at 8 A.M., followed by a second at 10 A.M., also felt at Donau-Eschingen. The violence of the shocks is reported very variously, even different people in the sameroomperceiving them differently. More shocks. They recurred daily, though with decreasing violence, up to the 21st. Several shocks. At Lisbon they were nearly as violent as those of the 8th and 18th November. At Ingolstadt another shock.	provinces of France.	felt daily, always preceded by a little trembling some time before, the wind falling at the same time. At Vevey, Morges, Lausanne, and Nyon the shocks were violent. At Vevey they were most so in the streets running along the lake. The same was true at Geneva. The shocks were scarcely at all felt on elevated points. At almost all places they were accompanied by a loud noise. It was said that the Aar was covered in some places by a thick vapour and appeared to boil, a moment before the shocks. All through Switzerland bells were made to sound, doors and windows moved, and buildings were cracked and injured. At Chiavenna rocks were detached from the hills. At Zurich the people believed that they smelt an odour like sulphur after the shocks. Ice was cracked in some places. At Berne the barometer was at 27 in 7 lines, and at Bâle at 27 in 4½ lines. At Morat a magnetic needle moved 0° 25' to the west, about the moment of the shock. At Hohen Ems, a magnet suspended by a cord of 11 inches long swung more than 40° from the vertical (!).	
1755. Dec. 10.	Brieg in the Valais	More shocks. They recurred daily, though with decreasing violence, up to the 21st. Several shocks. At Lisbon they were nearly as violent as those of the 8th and 18th November. At Ingolstadt another shock.			Phil. Trans. &c. as before.
11.	Lisbon, Colares, Madrid, and Orleans in Spain and Portugal. At Brieg also the shocks recurred; and in the Electorate of Ingolstadt in Bavaria.				Ditto; Gazette de France, 10 Janv. 1756.



Third Report on the Facts of Earthquake Phenomena (continued).

By ROBERT MALLET, C.E., M.R.I.A.

Catalogue of recorded Earthquakes from 1606 B.C. to A.D. 1850.

[Continued from Report for 1852, p. 176.]

1. ANNO DOMINI.	2. Locality.	3. Direction, duration, and number of shocks.	4. Phenomena connected with the sea.	5. Meteorological and other phenomena.	6. Authority.
Dec 13.	Strasbourg, Huningen,	Slight tremblings			Coll. Acad.; Journ. Hist.
between 2	Bourg en Breuse, Dijon,				
and 3 P.M.	Flacigny, Monthard, and many places in Franche Comté.				
— 15.	Brieg	Ditto			Phil. Trans.; Coll. Acad. Collection Académique.
— 17.	In the Aargau, and still Ditto				
— 18	The village of Glonsow, A violent shock			Accompanied by a frightful subterranean noise. About 500 yards from the village a piece of land of two acres in extent sank down. The hills near had been shaken in the month of March preceding. This account is obviously confounded with that of the 18th November. The latter appears likely to be the correct one.	Gazette de France, 10 Janv.; Journ. Hist. Fér. 1796, p. 134.
— 19.	The same region of N. America which had been shaken on the 18th and 22nd No- vember.	Renewed tremblings			Collection Académique.
— 20.	Brieg in the Valais. Also Another shock parti- ing the at the village of Locle. cularized ght.				Philosophical Transactions, &c. cit.

Dec. 21. Brieg again, and the whole country round, the 21st to the 27th A.M. Also at Lisbon and the country round, with the kingdom of Algarbia.	Rather violent. From the 21st to the 27th were felt daily at Brieg, but at various hours. At Lisbon the disturbance was again violent.		Some stones and tiles fell from the houses. In Portugal fresh disasters were produced by the shocks of this day. More than 300 persons perished under the ruins of houses which were thrown down, or in the waters of the Tagus, which overflooded its banks. A league of country was submerged by the sea in Algarbia. The extremity of Cape de la Bague was carried away. The towns on the frontier of Spain suffered least.	In Ditto; Coll. Acad., &c.
22. In the mountains of Roussillon.	A trembling.		v. Hoff quotes Kant.	v. Hoff quotes Kant.
24. At Besançon, Lyons, and Geneva.	Sensible shocks		v. Hoff give the 23rd as date.	Coll. Acad.; Journ. Hist.
25. Milan and in the Mar. grave of Ancona.	Two strong shocks		Great damage done. A thousand victims perished	Hoot, <i>loc. cit.</i> ; Gazette de France, 20 Fév. 1756; Journ. Hist. Avril, 1756, p. 304.
Also at Lisbon.	Shocks a little more violent than those which were constantly occurring, but have not been particularized. Slight shocks were felt almost every day from this up to the 6th January.		The Collection Académique gives the dates 27th and 29th December for the events here mentioned (on the authority of Perrey) on the 27th and 29th November.	Coll. Acad.; Gazette de France; Journ. Hist.
26. Maastricht and Cologne.	A slight shock followed by another more violent at 4½ P.M.			Ditto; Phil. Trans. &c.
27. and In the district of the Lower Rhine, especially at Brussels, Liège, Maastricht, Nimwegen, and even as far as Arnheim and Breda. Also in Cologne, Bonn, some valleys of Ahece and Lorraine, in Picardy, and in the Alps.	Two shocks, at the hours mentioned. Both were undistorted. At Brieg a shock was felt at 11½ 56".		In the Alps some wells became salt. v. Hoff appears to have confounded those mentioned on the 26th and 27th November with these, as it is very improbable that they were really distinct events. All the dates about this period, especially those taken from the Philosophical Transactions, are most confused, and many of them obviously inaccurate.	

1.	2.	3.	4.	5.	6.
1755. Dec. 27. 15 min. after midnight of the 26th, and at 1 A.M. 30 min. past midnight (or 2 A.M.).	The region of the Lower Rhine, as before, at Maestricht, at Sedan, Liège, and Cologne.	At Maestricht two shocks at the time stated, the first stronger than the second. At Rocroy a second shock at 12 min. past midnight. At Sedan and Liège, two, and at Cologne four shocks were felt. Shocks were also felt at 4 A.M.		These shocks were preceded, at Rocroy and other places, by a dull noise, lasting but a short time. The heavens too appeared as if all on fire. No damage was done, except at Chesnée, a village near Liège, where the second of the two shocks threw down two houses and shook others. A prolonged noise like that of musquetry was heard there. In the Valais the shocks still continued, they were especially violent at 2½ P.M.	Coll. Acad.; Gazette de France; Journ. Hist.; Phil. Trans., &c.
— 3¼ A.M.	Roussilon, in the neighbourhood of Canigou, at the foot of the Pyrenees.	Six undulatory or ballancing movements of the earth in the two hours after.		Each movement was preceded by a subterranean noise.	Ditto.
—	At Cordova; Aix in Savoy.	Shocks were felt at these places. The hour not mentioned.			Collection Académique.
— 28. 6 A.M. 6 ^h (Italian time.)	Brieg in the Valais..... Padua	Two slight shocks ... One ditto.....		At the end of this month there was an eruption of Vesuvius.	Phil. Trans. p. 616. Ditto, p. 615.
— 30. 1 A.M.	Brieg again	The shocks recurred		Some portions of chimnies were thrown down. The Rhone was often troubled, and appeared to boil during these shocks.	Collection Académique, p. 640.
— 31. Shortly before 1 A.M.	Also at Madrid At Glasgow, Greenock, Dumbarton, Inchinnan, and other places in Scotland.	One shock Three consecutive shocks.		The shocks were felt in the different stories of the houses at Dumbarton, where birds appeared greatly frightened in their cages.	v. Hoff. Phil. Trans. p. 509; Coll. Acad.; Gazette de France; Journ. Hist.
1756. Jan. 1. About 7½ P.M.	Ancona 2. In the west of Ireland...	A smart shock..... Ditto		But little damage done A meteoric phenomenon (the heavens appearing like a sea of flame), which was probably an aurora, was observed from 4 to 7½ 18 ^m P.M., the latter 18 minutes were the most brilliant. This was soon followed by the shock, which did no damage except at Ballymore, a village some	Gazette de France, 20 Fév. Journal Encyclopédique, Février et Mars.

— 5 P.M. Briege in the Valais. Also felt at Geneva.	Slight movements	miles from Tuum. A meteor was observed at Perth in Scotland about 9 or 10 P.M., but no mention is made of subterranean commotions.	Phil. Trans. &c., as quoted above.
Given Boston in Massachusetts Jan. 3. Briege	Ditto		Kefertstein.
0 A.M.			Phil. Trans. &c.
— 6. Ditto	A rather more violent shock.		Ditto.
8 P.M.	Two ditto consecutively.		Ditto.
— 7. Ditto	One ditto.		Ditto.
— 8. Ditto			Ditto.
P.M. not	A slight shock.		Gazette de France, &c. cit.; Journ. Hist.
Rimini in Italy	Two more shocks at the hours stated.		Phil. Trans. &c.
— 11. Briege	More slight movements.		Ditto.
— 12. Ditto	Fresh shocks. (This expression perhaps refers to shocks felt in this region on the 1st November before.)	The mines were inundated, and filled with a smell of sulphur. At Oermlissen near Herfort, during the night of the 13th-14th, during a violent tempest, the earth opened, forming a pit of 32 feet in diameter, and more than 50 toises deep, and full of water. This may have proceeded from an earthquake, but no shock is mentioned.	Gazette de France, 14 et 28 Fév. 1756; Journ. Hist.; Coll. Acad.; Kant, Géog. Phys.
Prague, and on the frontiers of the kingdom of Bohemia, extending to Barrenstein, Zinnwald and Altenberg.			
— 13. Briege	Slight motion		Phil. Trans. &c.
— 14. Ditto	Violent undulations, lasting but 3 or 4 secs.	No damage done.	Ditto.
A.M.	Tremblings	This is probably only the same event with that of Hoff. just reported on the 12th.	
In the Saxon and Bohemian Erzgebirge, especially at Altenberg and Zinnwald. Also felt at Erfurt.			
— 15. Briege	A moderate shock in the direction S. to N., followed by others at various hours.	Three hours before the shocks the wind suddenly fell, and a slight trembling was felt. Bodies thrown to the ground were in the direction S. to N., and fissures in the same direction opened in the earth.	Phil. Trans. &c.
A.M.			

1.	2.	3.	4.	5.	6.
1756. Jan. 15. 4 ^h 30 ^m A.M.	Ancona	A violent shock .....	.....	This event is only mentioned in the Journal Historique, and is probably the same as that of the 1st, one or other date being erroneous.	Journ. Hist.
.....	Amersfort in the province of Utrecht. ....	.....	.....	A shock which caused much consternation, but did no damage. v. Hoff mentions erroneously another shock at this place on the 15th of December before.	Phil. Trans. p. 513.
— 18.	At Lisbon. Also this day at Casal-Maggiore, at Ferrara, Spoleto, Albano, Fano, Orvieto, and Rimini.	A trembling, followed by many others, at Lisbon up to the 3rd of February. ....	.....	.....	v. Hoff.
At midnight.	Brieg	Another shake, rather violent, but very short. ....	.....	.....	Phil. Trans. &c.
“About this time.”	In Peru	An earthquake. ....	.....	.....	v. Hoff.
— 19.	Brieg	A movement not so great as the last. ....	.....	The air was very cold.	Phil. Trans. &c.
45 ^m past midnight.	Constantinople	Three rather strong shocks. ....	.....	Probably at the same time as the last, the one reckoning it as the 19th, the other as the 20th.	Phil. Trans. loc. cit. p. 122.
12 ^h 34 ^m P.M.	Lisbon	More violent shocks. ....	.....	.....	Journal Encyclopédique, Mars 1756.
— 21.	Brieg	Rather violent. ....	.....	.....	Phil. Trans. &c.
About 11 P.M.	Ditto	Differing but little in violence from that of the 9th, but very short. Followed by other slighter ones. ....	.....	.....	Ditto.
— 22.	Ditto	Two shakings, the first the more violent of the two. ....	.....	.....	Ditto.
A little before midnight.	Constantinople	Another shock .....	.....	.....	Ditto.
— 23.	Brieg	Several slight movements. ....	.....	Also felt at Berne, and at Demonte in Piedmont.	Ditto.
In the morning.	Ditto	Ditto .....	.....	Some persons believed that they felt a shock at Berne.	Ditto.
— 24.	Ditto	Ditto .....	.....	.....	Ditto.
— 25.	Ditto	Ditto .....	.....	.....	Ditto.
— 26.	Ditto	Ditto .....	.....	.....	Ditto.

— 26 —	Ditto	Ditto	Ditto	Ditto
3 ^h 55 ^m A.M.	Bonn and Cologne	At Cologne a slight shake from E. to W., lasting 7 or 8 secs. At Bonn it resembled that of the 26th Dec.		Coll. Acad.; Journ. Hist.; Gazette de France.
11 P.M.	Brugg and throughout the lower Aargau.	More shocks	No damage done	Ditto.
1756. Jan. 27.	Brieg	Slight ditto	From this until the 6th Feb. the shocks were feebler and less frequent in the Valais and Berne.	Phil. Trans. &c.
— — —	Dalecarlia in Sweden	Some more shocks		Gazette de France, 28 Fév.
Feb. 1.	Aigle	More shocks		Bertrand.
2 and 5 A.M.	In Piedmont and Savoy	Slight ditto	At 8 ^h 45 ^m A.M. of this day an extraordinary agitation of the waters of Closeburn Loch, a little lake in Dumfriesshire, was observed; the water rising in the centre, and moving in currents in opposite directions for 3 $\frac{1}{4}$ or 4 hours. No shock is mentioned.	v. Hoff; Phil. Trans.
— — —	2. At Arau. Also on the same day in different parts of Switzerland and Italy.	Ditto		Bertrand; Coll. Acad.
— — —	5. Ancona	A trembling motion		Keferstein.
— — —	6. Brieg	Another violent shock.		Phil. Trans. <i>loc. cit.</i> &c.
6 A.M.		Slight tremblings daily from this up to the 13th.		
— — —	13. Maestricht	A slight and short shock.	On the 12th and 13th irregularities were observed in the tides at Chatham Sheer.	Coll. Acad.; Phil. Trans. &c.
4 $\frac{1}{2}$ P.M.				

<p>Glasgow. Many places not mentioned, also experienced them.</p>	<p>noticed. Its direction appeared to be from E. to S. Many others had been felt there at the beginning of the month. At Brieg these shocks were also felt, and they recurred there at 1½ P.M.</p>	<p>A terrible tempest all day in Silesia. It was also somewhat felt in Switzerland, and seems to have been most violent about 8 P.M.</p>	<p>Kefenstein; v. Hoff.</p>
<p>18. In Silesia. Also at Prague, and in Albania.</p>	<p>Shocks were felt at all these places on this day.</p>	<p>Stones and plaster fell from the walls of the houses.</p>	<p>Phil. Trans. loc. cit.</p>
<p>19. Maestricht, and other places in Belgium.</p>	<p>A short but violent shock.</p>	<p>At Maestricht scarcely a day passed, until the beginning of April, without a shock. More than eighty distinct earthquakes were reckoned there. In general the shocks were felt more in the upper stories of the houses than on the pavement. They were felt less strongly in the upper part of the town. During some of the most violent lightning was observed. On every occasion a noise like that of a carriage in motion was heard. They occurred in all weathers, except that often it was calm before the shock, and the wind arose soon after. The barometer was high, and the weather very variable. Clouds and aurora were often observed. Some persons felt a sensation like that of a strong electric discharge. Horses, cows and pigeons were much alarmed, often long before the shock. Igneous meteors were common in Switzerland for some time after.</p>	<p>Phil. Trans.</p>
<p>20. Maestricht, and the rest of Belgium.</p>	<p>More shocks.</p>	<p>Here Bertrand's catalogue stops</p>	<p>Ditto.</p>
<p>21. Brieg</p>	<p>Shocks feebler than those of the 19th.</p>		
<p>22. Ditto</p>	<p>Two slight shocks</p>		

1.	2.	3.	4.	5.	6.
Feb. 27. In the Tyrol; at Trente and at com- ment march.	Several rather violent shocks. They continued more or less for three weeks.	On the 27th, at 6 p.m. at Ilfracombe in Devonshire, the sea rose 6 feet, as on the 1st November, and remained so for half an hour without ceasing to boil as it were in a remarkable manner. No shock is mentioned. During the whole course of the month the tides were very irregular at Chatham, Woolwich, Sheerness, and Deptford.			Coll. Acad.; Gazette de France, 30 Avril; Bertrand; 5th Mem. Journ. Hist. Mai; Phil. Trans. <i>loc. cit.</i>
At At Rondhelem, twenty end of leagues from Dron- month. them in Norway.				A mountain is said to have fallen and interrupted the course of a river, thereby causing an inundation. No shock is mentioned, and it may have been only a landslide. v. Hoff, on the authority of the Coll. Acad., says in March. The earth had been perfectly still for some days, but this shock, which was followed by many others during March, produced fresh alarm in the city.	Gazette de France, 10 Avril.
Mar. 1. Lisbon	A more violent shock than any felt since the 21st December.				Coll. Acad.; Journ. Hist. Mai, p. 368.
3. At Brieg	Several shocks			At Bernie, in the Pays de Vaud, in the bishopric of Bâle, and elsewhere, a brilliant meteor was observed at 7 p.m.	Coll. Acad.; Phil. Trans. &c.
5. Ditto	Ditto			A second meteor was observed this day at Aigle. Ditto. and Vervey, at which places, as also at Avignon, the former one was seen. At Avignon a third was observed on the 3rd of April.	
7. Ditto. At Oddivillas also, in a village 2 leagues from Lisbon, on the same day.	Ditto. At Oddivillas a rather violent shock.			At Oddivillas the shock was accompanied by a loud noise like the report of a cannon, repeated many times by an echo.	Ditto; Gazette de France; Journ. Hist.
8. Turin	Two slight shocks, apparently from				Phil. Trans. p. 615.
A.M.					

Belera near Lisbon	above downwards. Six minutes after- wards a slight oscil- lation from S. to N. One shock			Ocasional considerable alarm	Gazette de France; Coll. Acad.; Journ. Hist.
Jan. 11. Lisbon	Ditto			Some houses were thrown down	Ditto.
— 29. Ditto	A violent ditto		The waters of the Tagus were much swollen.	The shocks at Lisbon during this month were generally perceived either at sunrise or sunset.	Ditto.
Feb. 13. Venice, Padua, Verona, and Trevis.	A shock lasting half a minute, followed by another at 3 P.M.			At Trevis chimnies were thrown down and houses injured.	Coll. Acad. p. 644; Gazette de France; Journ. Hist.
— 15. Lisbon	Very violent shocks				Ditto.
— 16. Venice, Padua, &c., as above.	Consisting of two distinct shakes.			Preceded by a loud subterranean noise.	Ditto.
— 18th h.	Another shock, from S.E. to N.W.				Ditto.
— 26. Breteuil. Also felt at Pleisis and St. Just.	At Breteuil four shocks, the third the most violent. At the other places two shocks, longer, but less alarming.			On the 24th, 25th, 26th and 27th, Vesuvius was in eruption. Loud subterranean noises were heard there.	Ditto.
— 27. Lisbon	More violent shocks				Ditto.
— 30. Paris, Versailles, and the Chateau du Pleisis, four leagues from Montdidier.	At the chateau du Pleisis, the shock, which was consi- derable at all the places, lasted fifteen minutes.			At the chateau du Pleisis a noise was heard like the wind blowing through a high wood. At Breteuil the noise was heard every half-hour during the night.	Ditto.
Lisbon	More shocks of equal violence with the last.			More than thirty violent shocks were counted at Lisbon in the course of the month. They were most remarkable on the three days no- ticed.	Ditto.
187 23 24	15. Sains near Breteuil. Also felt at Beauvais, Mont- didier, and Clermont.			Attended by a low noise, which recurred every half-hour until night. At Beauvais and Bon- villers exhalations in a state of inflammation were observed at the moment of the shock.	Collection Académique.

1.	2.	3.	4.	5.	6.
May 22, Ulm and Augsburg d 25.	The earth shook on these days.	The earth shook on these days.			v. Hoff.
30. Near Lisbon, in the mountains of Cautra.	In the A shock was felt, beginning the first for fifteen days.	In the A shock was felt, beginning the first for fifteen days.		A terrible tempest had raged over the country on the 24th, 25th, and 26th. The Collection Academique gives the date 29th June.	Journ. Hist. Août, 1756, p. 145 ; Gazette de France, 17 Juillet. Coll. Acad.; Phil. Trans. vol. xlix. p. 893 ; Gazette de France, 19 Juin.
June 3. Aix-la-Chapelle, Liège, Maestricht, Cologne, Duren, Nittart, and the whole country lying between th Rhine and Meuse, and which was shaken on the 18th and 19th of February.	The shock was much more violent at Duren than at Aix-la-Chapelle, and was followed by several others over the whole district shaken.	The shock was much more violent at Duren than at Aix-la-Chapelle, and was followed by several others over the whole district shaken.			Bertrand; Coll. Acad.; Acta Helvetica, vol. iii. p. 438.
7. In Neuchâtel, at Colombières, and Chaux-de-Fond.	At Colombières it was an oscillatory movement from E. to W. Other shocks followed 18 minutes after. At Chaux-de-Fond there were four periods of disturbance from 8 ^h 43 ^m , and another at 11 p.m. The shocks, which were vertical at this place, appeared more violent than elsewhere.	At Colombières it was an oscillatory movement from E. to W. Other shocks followed 18 minutes after. At Chaux-de-Fond there were four periods of disturbance from 8 ^h 43 ^m , and another at 11 p.m. The shocks, which were vertical at this place, appeared more violent than elsewhere.			Ditto. Collection Académique.
22. Ditto July, Brie in the Valais. Also Shocks felt at both ending of the month. In the bailiwick of Interlaken.	More shocks occurred. Shocks felt at both places.	More shocks occurred. Shocks felt at both places.		On the 18th a cloud of smoke arose from the ground, which obscured the light of the sun. While this obscurity lasted a smell of sulphur pervaded the air.	Ditto. Gazette de France, 4 Sept. ; Journ. Hist. Nov. p. 386.
10. Lisbon d 11.	Two violent shocks	Two violent shocks			Ditto.
18. Ditto d 11.	Another but a slighter shock.	Another but a slighter shock.			Ditto.

Aug. 3. Obedas in Portugal.....	A very violent shock.....	A chift opened, from which a great quantity of water gushed out.....	Gazette de France, 25 Sept.; Journ. Encycl. Oct.; Journ. Hist. Nov. p. 386. Phil. Trans. 1757, p. 58.
— 13. In Piedmont, at Turin.....	Slight shocks.....	.....	.....
— 17. Padua.....	Several shocks.....	.....	.....
noon.	.....	.....	.....
—
—
bet. 20. Sicily, and in the Morea, especially in the gulfs of Lepanto and Corinth.	Several shocks during the month. Violent shocks.....	.....	.....
— 22. Naples.....	A violent shock lasting nearly 4 min.	.....	.....
— 29. Lisbon.....	One rather smart shock.	.....	.....
Nov. 9. Genoa.....	Two undulatory shocks from N. to S.	.....	.....
5 ^m and 10 ^m at (?)	.....	.....	.....
— 16. Boston in N. America.....	A slight shock for two seconds.	.....	.....
— 17. Inverthallan in Argyle-shire.	Lasted about 20 sec. Two other shocks were felt two days after.	.....	.....
— 19. Cologne, Liège, Bonn, Malmédy, Mœstricht, Limburg, and the whole district between the Rhine and Meuse.	A shock of thirty seconds duration.	.....	.....
— 20. Barcellos in Portugal.....	A violent shock.....	.....	.....
— and The island of Sumatra.....	Several shocks during the two months.	.....	.....

1.	2.	3.	4.	5.	6.
Dec. 4 9.	Cascaes, Ombra, Colares. Several shocks in Portugal.	Several shocks		That of the 8th threw down some houses at Sezimbra. The Journal Historique reports these facts and those of the 28th Nov. on similar dates in August and September, but obviously erroneously.	Gazette de France, <i>loc. cit.</i> ; Mercure de France, <i>loc. cit.</i>
— 19 P.M.	Boston in N. America.	A slight shock			Silliman's Journal, vol. xl. p. 206.
— 26	Several places in Corn- wall.	Several shocks			Collection Académique.
— 27	In the island of Luzon.	An earthquake		And a volcanic eruption.	Phil. Trans. 1756, p. 458.
— 28	In Kautschutka.	Ditto		Preceded some moments by a subterranean explosion like that of a cannon.	Gazette de France, 5 Mars; Journ. Hist. Avril, 1757, p. 309.
— 15-16; of 15-16;	Jan. Lisbon	One shock			Collection Académique.
— 18	In Franche-Comté, and in Alsace.	Several shocks		Preceded and accompanied by subterranean noises. Similar sounds had been heard during the latter end of January; on the 1st (or 21st?), 22nd, 23rd, 24th, and 25th. The Collection Académique gives the date 4th March. That here given is probably the correct one.	Gazette de France, 12 Mars, 1757; Journ. Encycl. Mars, 1757.
Feb. 4	Austo and Aggerschow in Norway.	Two shocks		One of those on the 15th or 16th preceded by a loud noise.	Collection Académique, p. 646.
— 8 and 16. Mar. 1.	Lisbon	More shocks			Ditto.
— 16 30 th P.M.	Ditto	Another, rather violent.		Accompanied by loud subterranean noises	Journ. Encycl. Avril et Mai, 1757; Gazette de France, 16 Avril et 7 Mai; Journ. Hist. Mai, p. 376, et Juin, p. 467.
— 17 M.	Ditto	Undulatory ditto			Ditto.
— 18 30 th A.M.	Ditto	Ditto		Ditto. Some houses at Cascaes were thrown down by these shocks.	Collection Académique.
April (or 7 15).	Salée on the coast of Morocco.	An earthquake of three minutes duration.		Some days before it had been learnt that Cape Cantain had been convulsed by subterranean motion, and that the earth had opened there into fissures in which buildings were swallowed up. v. Hoff says this earthquake at Salée took place on the 5th of April or May. In the month	

1757. End of June or beginning of July.	Near Cascaes in Portugal.	Some more shocks	of April the volcano previously active in the island of Fuego (Cape de Verds) fell, and buried a village at its foot.	Gazette de France, 6 Août, quoting "la rubrique de Madrid" of July 19.
July 8. 2½ P.M.	Boston in Massachusetts.	A considerable shaking, but lasting a short time only.		Silliman's Journal, vol. xl. p. 206.
9. 11h 45m P.M.	Throughout the Azores.	A terrible shock, lasting about 2 mins. It was at first vertical, but soon changed to horizontal, in the direction W. to E.	All the houses of Angra (Terceira) were violently shaken. In the island of St. George (12 leagues from Terceira) 1053 persons were destroyed beneath the ruins of their houses.	Collection Académique; Mercure de Madrid, 1757, Dec.; Dulac-Mélanges d'Hist. Nat. t. iv. p. 333; v. Buch, loc. cit. p. 368; Journ. Hist.; Gazette de France; Journ. Encycl
10. About 10 A.M. and 4 P.M.	Ditto. But feebly felt in the island of the Pic, except in the quarter opposite to the island of St. George. The shocks were also slight in the islands of Fayal, St. Michel and St. Marie. In one or two of the islands nothing was felt.	Another shock at 10 A.M., followed by one at 4 P.M. as violent as that of the day before, but shorter. Slight shocks did not cease until the 2nd Sept.	Eighteen new islets made their appearance at 100 fathoms to the N. of the island of St. George. Immense ruins were caused in all directions. Great landslips took place, the detached masses sliding into the sea, and in some cases holding together with the houses, &c. on them, and appearing as islands above the surface. Monte Formoso, in the E.S.E. of this island, separated into two parts, of which one fell into the ocean, and was separated more than 100 fathoms from the remainder. In the island of Topo terrible devastation took place. The earth opened in several places, and a piece of land of nearly a quarter of a league in size slid into the sea. In some localities the hills changed their place, and in others they disappeared altogether. A part of the village of Norte Grande was separated to the distance of 150 fathoms from the rest, forming a new island. The falling masses of rock and the gaping chasms in the earth terrified the inhabitants so much that they lived solely in the woods.	Ditto.

1.	2.	3.	4.	5.	6.
July 15. In the Scilly Islands and Cornwall. Most violent in the island of St. Mary, and extending with diminished intensity to Penzance, Marazion, St. Ives (6 English miles from Penzance), Tobidy, Redruth, St. Conalomb, Bodmin, to Camel-ford, 90 English miles from the Scilly Isles. At Lostwithiel, Liskeard, and even at Loo and Plymouth, they were slightly felt.	The shocks lasted six seconds, in some places half a minute. They were apparently from S.W. to N.E.	Two young people of the parish of St. Just, who were bathing, were struck by the unusual agitation of the waves.	In some of the Cornish mines these shocks were very strongly felt. Rolling noises, like thunder, or wagons in motion, were heard in the mines, at depths varying from 18 to 70 fathoms. Moveable bodies were visibly shaken, but no damage was done. The weather had been very calm and hot for eight days before, the wind E. and N.E. On the 14th it changed to S.W., and a shower of rain fell. The barometer was rather high, but very unsteady. On the morning of the 15th a fresh N.W. wind blew, and the air was cold. On the strand at Penzance unusual marks were observed in the sand at 10 A.M. Where it was generally quite smooth a space of 100 square yards was covered with little elevations like mole-hills with holes in the tops, "as if something had issued thence," and separated by little depressions of equal diameter. From one of these depressions a jet of water of the size of a man's wrist issued, a phenomenon never observed before or after. The noise heard appeared to last half a minute, or, in the Scilly Isles, 40 seconds.	According to some authors half of the town of Syracuse was destroyed, and 10,000 persons perished. At the end of this month a violent eruption of Vesuvius. Followed by a violent tempest. Preceded by a very high wind, which ceased immediately after the shock. The earthquake occurred at the time of full moon.	Phil. Trans. vol. L. pt. 2. p. 499.
Aug. 6. At Milan and Syracuse. A violent earthquake. Also felt at Bale.					
— 29. In the island of Barba. A considerable earthquake.					
— 30. Florence does.					
Oct. 13. Tornea in Lapland.					
— 27. Havre and Pont-l'Évêque.	Two tremblings. The first lasted 3 minutes, the second 2 minutes.				
Nov. 8. Bale.	A slight trembling.				
					Collection Académique; Merian quotes Prof. d'Annone's Meteorological Register; Gazette de France, 24 Sept.; Jour. Hist. Nov. p. 379. Collection Académique. Gentleman's Magazine, vol. xxvii. p. 429. Cotte in Journal de Physique, t. lrv. p. 331. Gazette de France, 5 Nov.; Coll. Acad. Acta Halvetica, vol. iii. p. 385; Merian quotes Prof. d'Annone's Meteorological Register.

Dec. 31. 6 A.M.	Especially at Evora. Lisbon	A single shock lasting 30 or 32 secs. It was the most violent felt there since the 1st Nov. 1755, even than that of the 9th Dec. 1755.	.....	Accompanied by a loud explosive noise. No damage was done.	No Collection Académique; Gazette de France, 4 Mars; Journ. Hist. Avril, 1758, p. 309.
1758. Jan. Beginning of the month (or in Dec. 1757).	Province of Constantine in North Africa, and at Tunis.	Fresh shocks of earthquake, some very violent.	.....	Some time during this year a remarkable submarine eruption took place 3 leagues from Pondicherry in the East Indies.	Journ. Hist. Mars, 1758, p. 238.
2 A.M.	In the parishes of Worth and East Grinstead in Sussex, Lingfield in Surrey, and Edenbridge in Kent.	A slight trembling, lasting but a moment.	.....	The province suffered very much, and at Tunis the houses fell in great numbers, several thousand people perishing in the ruins. This account is taken from a letter from Genoa of the 18th January; the shocks may therefore have taken place in 1757.	Phil Trans. vol. 1. pt. 2. pp. 614 & 645.
Same day, in the daytime and at night.	At Herculanum	An earthquake	.....	Accompanied by a rolling noise. The windows were made to rattle.	Ditto, p. 622.
and in Feb.	Lisbon	More shocks in these two months.	.....	v. Hoff erroneously gives the date 24th March...	Gazette de France, 29 Avril
Feb. Beginning of the month.	At Naples. And about Vesuvius.	A trembling at Naples. On Vesuvius the shocks were violent.	.....		Ditto, 25 Mars.
Apr. 13.	At sea, in 0° 20' S. lat., and 23° 20' W. long.		The frigate La Fidéle, Capt. Lehoux, experienced shocks here on this day.		Daussy's Memoir, as quoted above.
24. 9½ P.M.	Annapolis in Maryland, and more feebly in Pennsylvania.	A trembling, lasting thirty seconds.	.....	Preceded by subterranean noises, which increased by degrees.	Collection Académique, t. vi. p. 648.
July 3. 0h 45 A.M.	Lisbon	A somewhat violent shock.	.....	Preceded by subterranean noise. The shock was felt in all quarters of the city. In the month of May the island Bondico, or Pondico, and two other small isles near it (in the gulf of Zeitoun, near Negropont), sank suddenly into the sea. No earthquake is mentioned.	Coll. Acad.; Almanach de Dijon, 1759, p. 146.

1.	2.	3.	4.	5.	6.
Aug. Be- ting of Nov.	Vesuvius ... Etna, in the d Bronte.	A slight shock... A violent ditto		Followed by an eruption from the summit of the volcano. Followed, after some time, by a slight eruption. A little lava flowed from the crater. Both Etna and Vesuvius, having been almost com- pletely at rest since 1753, began to show symptoms of activity about this time. Very little damage done.....	Gazette de France, 10 Fév. 1759; Jour. Hist. Mar., p. 223. Gazette de France, 6 Janv. 1759. Coll. Acad.; Abb. d. Acad. v. Stock- holm (German translation), 1759, p. 221.
Dec.	Cow-wintuple ... n 3 and 4.	A rather violent shock, lasting however only a short time. A considerable earth- quake. It lasted three hours accord- ing to some, or only half an hour accord- ing to other accounts. A slight shock.		A terrible tempest, which lasted the same time as the earthquake, accompanied it. The storm threw down many houses in Arch- angel, where the earthquake was not felt.	Gazette de France, 10 Fév. 1759; Jour. Hist. Mar., p. 223. Coll. Acad.; Abb. d. Acad. v. Stock- holm (German translation), 1759, p. 221.
— 20	London and the neigh- bourhood.	Two shocks			Gazette de France, 6 Janv. 1759.
— 31.	In Kent, Lapland. Also at the same time in England.	A considerable shak- ing.		Preceded by a subterranean noise. Perrey sug- gests that the shock in England referred to may be that of the 20th. In the beginning of the month the mountain called General's Bergsund, near Stockholm, is said to have fallen. No mention is made of any earthquake shock being perceived. Preceded by a rumbling noise	Coll. Acad. t. xi. p. 13; Abb. d. Acad. v. Stockholm (German translation), loc. cit. Collection Académique. Doddsey's Annual Register, vol. ii. p. 88.
Feb. 2.	Boston in Massachu- setts.	One shock			Doddsey's Annual Register, vol. ii. p. 88.
— 24.	Liskeard in Cornwall ... A.M.	Ditto, of a vibratory character, lasting two or three secs. Violent shocks.		Blood-red rays were observed, converging to one dark spot in the heavens. This phenomenon lasted fifteen minutes. (Probably an aurora.)	Ditto, vol. ii. p. 73. Collection Académique, p. 649.
— of the adjoining parts of S. America.	In Berbice Surinam, and the adjoining parts of S. America.	A strong trembling motion.			Ditto.
Mar. 18.	Pistoia in Italy	Another ditto			Ditto.
April 18.	Ditto	Another ditto		Hoff does not mention any shock on the 18th. of March. It is probably a mistake. During	Ditto.

1759. Apr. 25. Lisbon	Rather heavy shocks .....	.....	this month, and until August next, Etna was in eruption, and Vesuvius recommenced its activity.	Ditto, p. 650.
— May. The country around Etna.	Very sensible shocks .....	.....	The volcano was in active eruption	Ferrara, Descrizione, &c. p. 121.
— Middle of the month.	Violent shocks .....	.....	At Mareico-Nuovo (near Naples) the shocks were so violent that the people lived in the open country under tents.	Collection Académique.
— June 10. Aleppo	Very slight shocks .....	.....	.....	Phil. Trans., vol. li. p. 529.
— In the morn ^g .	A very violent shock, followed by two others in the space of three hours.	.....	.....	Collection Académique.
— 22. Salonica	More shocks, of which one was very intense.	.....	.....	Ditto.
— 23. Ditto	Two more violent shocks. Fifty-four had been counted up to this date, and more were felt in July, August and September.	.....	Philippopoli suffered much from this earthquake	Ditto.
— 29. Ditto, and the town of Philippopoli near Salonica.	Numerous shocks were felt for fifty or sixty days, up to the end of August.	.....	Constantly accompanied by horrible subterranean explosions.	Sonneschmidt, Mineralog. Beschreib. d. vorzüg. Bergw. Revue v. Mexico, 1804, S. 325; Humboldt, Versuch üb. Neu Spanien. Th. ii. S. 145; ditto, Ideen zur Geogr. d. Pflanzen. u.s.w. S. 154; Atlas Pittoresque, p. 243.
— ... In Mexico, near the station of S. Pedro de Xorullo.	At Bordeaux two violent shocks from W. to N.E., each lasting two or three seconds. At Limoges but one shock, lasting about a minute, was felt.	.....	.....	Coll. Acad.; Gentleman's Magazine.
Aug. 10. Bordeaux. Also felt at Limoges and in the Limousin.	.....	.....	.....	.....
10½ P.M.	.....	.....	.....	.....

1760. Jan.	November. Ditto, especially at Mard- jorjos in Lebanon.	Ditto .....	.....	In the beginning of this year a great fall of a mass of rock near Drontheim in Norway is recorded by the Gazette de France, but no earthquake shock is mentioned.	Ditto; Volney, Voyages, 2 ^d e édit. t. i. p. 270.
— 11. — 4½ A.M.	Lisbon	Two shocks .....	.....	Preceded by a subterranean noise	Collection Académique.
— 16. — 1½ P.M.	Aix-la-Chapelle	A vibratory motion, with several smart shocks.	.....	Accompanied by great blasts of wind, increasing and decreasing with the shocks.	Doddesley's Annual Register, vol. iii. p. 69, 70.
— 18, — 19 and 20. 8 and 10½ P.M.	Ditto	Ditto .....	.....	.....	Ditto.
— 20. — 7 P.M.	Wicklow in Ireland ...	Vibratory .....	.....	A noise like a heavy carriage driving along was heard.	Ditto; Gentleman's Magazine, vol. xxx. p. 99.
10½ P.M.	Amsterdam and Maes- tricht. (The Coll. Acad. say on the 19th, 20th and 21st, at Am- sterdam, Leyden and Utrecht. The hour here given must refer to some of these shocks.)	Three shocks at Am- sterdam.	.....	Lightning and a slight trembling of the earth were observed before the shocks.	Doddesley's Annual Register, loc. cit.; Coll. Acad.
Hour not given	Paris and Versailles. And, same day, at Vé- zelay in Burgundy.	Slight shocks .....	.....	The Annual Register says, <i>about the same time</i> as the shocks in Holland, others were expe- rienced in France, Portugal and other parts of Europe. Antwerp is also mentioned as having felt these about the 20th, but the exact day is not given.	Ditto; Gazette de France, 2 Fév. et 8 Mars.
— 21. — Morning.	Cologne .....	.....	.....	.....	Annual Register, loc. cit.
— Night between 21 and 22.	Hamburg and Copen- hagen.	One shock, followed by three less vio- lent. Direction, N. to S. At Hamburg they lasted half a minute, at Copen- hagen one minute.	.....	The sea was much agitated at Elsinour.	Ditto.

1.	2.	3.	4.	5.	6.
1760, Jan. ...	In the Margravate of Ancona.	Several shocks.		Some damage done at Cascia.	Collection Académique.
— Feb. 3.	New England				Doddesley's Annual Register, vol.iii. p. 92.
— — 7.	Jamaica	A violent shock		No damage done.	Gazette de France, 3 Mai, 1760; Journ. Hist. Juin, p. 465.
— April.	Truxillo in Peru				Annual Register, vol. iii. p. 108; Coll. Acad.
— May 26.	Mezzo in the territory of the republic of Ragusa.	A trembling of 4 min. duration.			Coll. Acad.; Gazette de France, 28 Juin; Journ. Hist. Août, p. 151.
— June 16. 4 P.M.	Beneath the sea at Portici.	A very violent earthquake.	The sea was so opened and divided by the disturbance that it left the bottom dry for 2 mins.		Journ. Encycl. 1 Juillet.
— — 20. About 11 A.M.	Brussels, some other places in Brabant, and at Cologne.	Shocks slighter than those of the 20th Jan. before.			Collection Académique.
— July 16. 1 ^h 47 ^m A.M.	Brussels and several other towns of Brabant.	Three or four undulatory shocks.			Coll. Acad.; Phil. Mag. July 1828, p. 55; Annual Register.
— Aug. 13. About 7 P.M.	Constantinople and Vienna.	A very slight shock felt at each place at the same hour.			Journ. Hist. Oct. 1760, p. 302.
— — 14.	Salonica	One shock			Gazette de France, 6 Déc., quoting a letter from Salonica of the 29th Aug.; Journ. Hist. Janv. 1761, p. 75.
— — 15. 1 ^h 56 ^m A.M.	Ditto	Ditto		Followed by a brilliant meteor	Ditto.
— — 17. 9 P.M.	Ditto	Ditto		Violent thunder, wind and rain immediately succeeded the shock.	Ditto.
— — 21. 11 ^h 30 ^m A.M.	Ditto	The last shock. All four appeared to act in a vertical direction.			Ditto.
— Oct. 13.	Lisbon	Two shocks			Collection Académique.
— —	In Syria	Several shocks			Brewster's Encyclopædia, article Chronology.
— Nov. 9.	Boston in Massachusetts.	A slight shock.		More considerable in the country round Boston.	Gazette de France, 31 Janv. 1761;

8 A.M.	setts, and the country for thirty miles round.			than in that place itself. In the country a subterranean noise was heard.	Journ. Hist. Mars, 1761, p. 230; Mercure de France, Mars, p. 205; Annual Register, vol. iii. p. 149.
1760. Dec. 21 and 22.	Vesuvius	Several shocks		Followed on the 23rd and following days by one of the most remarkable eruptions of Vesuvius.	Gaetano de Bottis, Ragionamento Storico, &c., quoted by v. Hoff; Della Torre, Supplemento alla Storia del Vesuvio, Napoli, 1761; Hamilton's Campi Flegrei; Phil. Trans. vol. lii. pt. 1. pp. 39-44.
— 27.	Ditto	Violent ditto			Ditto.
— 28.	Ditto, and at Portici. Many of the shocks were felt as far as Naples.	Ditto, followed by tremblings more or less violent up to the 5th January.		The eruption continued with varying intensity up to the 6th January.	Ditto.
—	Lima in Peru	Several shocks during the month.			Annual Register, vol. iv. p. 189.
1761. Jan. Night of 4-5.	Portici and Naples	Violent shocks		During the eruption of Vesuvius the houses were much shaken.	Gaetano de Bottis, &c., just quoted.
— 8.	Lima in Peru				Annual Register, loc. cit.
—	Naples	A violent shock		The summit of Vesuvius fell in at this time. The Journal Historique gives the date 11th Feb.	The Gazette de France, 7 et 21 Fév.; Journ. Encycl. 1 et 15 Fév.
Night of 11-12.				During a terrible tempest the earth opened, and flames came out thence some days after.	Journ. Encycl. 15 Fév.
— 18.	Zuyglius near Grenoble.	Three shocks felt		Accompanied by a subterranean noise, and preceded by a terrible storm, which lasted up to 10 o'clock (of the night before?).	Gazette de France, 18 Avril, 1761.
10 P.M. — 24.	Hermösand in Sweden.	Violent shocks		At the same time an aurora borealis of great extent was observed. It had been remarked for some time before that auroras appeared after tempests and earthquakes.	Ditto.
7 A.M. — 25.	Ditto	Another earthquake			Ditto.
— Feb. Be-	Boston in Massachu-	A slight shock			Journ. Hist. Juillet, 1761, p. 65.
ginning of the month.	setts.			Attended with a rumbling noise	Annual Register, vol. iv. p. 69.
— 6.	Sturminster				
— 11					
Between 12 P.M. and 12 P.M.	In North America	Violent shocks		Unattended by any damage	Journ. Encycl. 15 Mai, p. 163.
— Mar. 12.	Boston in Massachu-	Two shocks from S.W. to N.E. The second of the two the greater.		The weather was perfectly calm. The sky over-head was clear, but the horizon all round was obscured by a whitish fog, looking as if there were a light behind it.	Annual Register, vol. iv. p. 117.
— 16.	setts.	They lasted 20 secs.			

1.	2	3.	4.	5.	6.
<p>Mar 31. At Lisbon, Setúbal, Oporto, and all along the coast of Portugal, past 12 m.</p> <p>at Madrid, Arrajuez</p> <p>At in Spain. Some vessels at sea off Lisbon (as H.M.S. Gosport, in lat. 14° 8' N. and long. 5° 16' W.) and the convoy along with her experienced the shocks. At Santa Cruz in Barbary; at Bayonne, Bordeaux, and Roussillon in France; at Amsterdam in Holland; at Cork in Ireland; at Funchal and throughout the island of Madeira; and at the Azores.</p> <p>35th A.M.</p> <p>at 8 o'clock (in time.)</p>	<p>Lisbon a very violent earthquake (the first so since the 1st Nov. 1755); shock the sea rose 6 feet at Lisbon, and in a perpendicular direction from below upwards. The movement lasted 5 min., and was followed by another shock at midnight and three more during the night (Others were said to have been felt before noon.) At Oporto the direction appeared to be N to S. At Madrid the shock lasted 24 min., at Aranjuez 3 min. On board H.M.S. Gosport and the other vessels, two shocks were felt, one at 11^h 45^m, and the other at 11^h 50^m. The first lasted 1½ min., the second not so long. At Santa Cruz in Barbary a slight shock only, lasting a quarter of a minute. At Bayonne the duration of the motion was 3 min. At Cork the shocks were violent, undulatory,</p>	<p>An hour and a half after (or according to others, during) the shock the sea rose 6 feet at Lisbon, and continued to ebb and flow to this extent at intervals of 6 min. until evening. At Cape Finisterre an extraordinary flux and reflux of the sea occurred at 15 min. past 12. The shock was perceived on board a vessel near the coast here. Vessels in the harbour of Amsterdam were much agitated. At Cork no commotion of the sea was observed, though the shock was felt there, while at other places on the coast where it was not sensible the agitation of the water was very considerable. Thus at Kinsale (at about 5^h 30^m or 6 p.m.), at dead low water the sea suddenly rose 2 feet, and then retired in about 4 min. This occurred several times. At Carrick the waters of the river Suir rose about 4 p.m.</p>	<p>Owing probably to the perpendicular direction of the shock very little damage was done at Lisbon. At Oporto much injury of houses, &c. took place according to some, while other accounts say directly the reverse. St. Ubes suffered much. On board H.M.S. Gosport it felt as if the cables were running rapidly round the bits in letting go anchor. A submarine noise was heard, and after the shock several of the vessels of the convoy were found leaking. At Corunna no houses fell, though many were moved from their positions; one more than 4 feet towards the sea, and its front towards the sea was altered in aspect more than two points of the compass. Several chasms formed in various places in the earth, from which sand and shells were thrown up. In some of the churches of Amsterdam the chandeliers swung a foot from their former position. At Funchal in Madeira a noise like that of carriages was heard before the shock. On the eastern coast of this island rocks were detached from their places, and rolled into the sea. The wells were turbid, and walls of 2 feet thick, running N. to S., were damaged. 4^h 30^m Barbadoes time = 8^h 30^m Lisbon time; hence the agitation of the waves at Barbadoes occurred about 8½ hours after the shock at Lisbon.</p>	<p>Phil. Trans. vol. li. pp. 141 & 418; Gazette de France, 2, 9, 16 et 30 Mai; Journ. Encycl. Avril et Juin; Journ. Hist. Juin, p. 466; Annual Register, vol. iv. p. 92.</p>	

1761. March. Thessalonica End of the month	Several shocks from S.W. to N.E.	<p>from E. to W., and side were, lasting a minute. At Funchal in Madeira a very violent earthquake. The vibrations were very rapid, and consisted of two periods, of increase and decrease. Their direction seemed to be E. to W., and their duration 3 min.</p> <p>to the extent of 4 feet in the space of 5 min. At Dougarvan five ebbs and flowings of the sea were observed between 4 and 9 p.m. At Ross in co. Wexford, a violent agitation of the river there took place about 7 p.m., and at Waterford the sea advanced 30 feet on the shore. At Mount's Bay in Cornwall, about 5 p.m., the sea rose 6 feet five times in the space of an hour. At the same hour it rose 4 feet at the Scilly Isles, the motion lasting two hours. At Fort Augustus in Scotland, the waters of Lough Ness rose and fell 2 or 2½ feet for three quarters of an hour, about 2 p.m. At the islands of Madeira and Terceira violent agitation was observed, and at Barbadoes (no land shock), from 4½ p.m. to 6 the next morning.</p>	<p>Preceded by a sound like that of the wind rising in the distance, and accompanied by a rumbling noise. Very probably these shocks were connected with that at Lisbon just described.</p> <p>Annual Register, vol. iv. p. 94.</p>
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1.	2.	3.	4.	5.	6.
Apr. 9, Santa Cruz in Barbary	Another shock, more violent than that of the 31st March.			The walls of most of the houses were split	Annual Register, vol. iv, p. 95.
— 14, Terceira in the Azores	Three slight shocks.				Same authorities as for the 31st Mar.
— 15, Ditto	A very violent shock. The earth continued to tremble slightly up to the evening of the 17th.				Ditto.
— 17, Ditto	Two more, very violent.			On the 18th a thick smoke appeared at 3 leagues to the N.W. of Angra. Subterranean noises like thunder had been heard for three days. On the 20th the earth opened, and three volcanoes formed, from which torrents of sulphurous and inflamed matter came forth. One village was almost completely reduced to ashes. Balbi (Essai, t. i. p. 102), as quoted by v. Hoff, gives a violent earthquake at Lisbon on the 30th of this month, but no other author mentions it, and in all probability v. Hoff is right in supposing it to be a mistake, the event of the 31st March being what is referred to.	Ditto.
June 9, Sherborne, Shaftesbury, An earthquake	and the country for 13 miles round.				Annual Register, vol. iv, p. 121; Gazette de France, 11 Juillet; Journ. Hist. Août, p. 149.
July 5, Madeira	Ditto	On the 28th of this month an extraordinary agitation of the sea was observed at Mount's Bay, Falmouth, Fowey and Plymouth, on the south coast of England. No land shock is mentioned.			Annual Register, vol. iv, p. 132; Phil. Trans. &c. &c. p. 507.
Aug. 14, Guernsey	Ditto	A violent swell of the sea set in from the S.W., the wind being E. at the time.		Accompanied by a hollow rumbling noise	Gentleman's Magazine, vol. xxxi, p. 378.

1761. Aug.	Santa Cruz in Barbary ..	Two shocks felt in this month.	.....	.....	Annual Register, vol. iv. p. 154.
— Oct. 16. Between 8 & 9 A.M.	At Verpillère and the adjoining villages, on the route from Lyons to Grenoble.	One shock .....	.....	Accompanied by noise, which terrified various animals.	Gazette de France, 24 Mai, 1762.
— Nov. 2. N.S. 1 P.M.	Fortin Nowikowski in Siberia.	A slight trembling motion.	.....	Accompanied by a rolling subterranean noise. Lightning was observed the following day at 4 A.M.	Phil. Trans. vol. llii. p. 204.
— — 6.	Ternel in Portugal	Three shocks, of which the first lasted several minutes.	.....	.....	Gazette de France, 25 Janvier, 1762.
— — 13. 2 ^h 30 ^m A.M.	Geneva.....	A slight shock .....	.....	Accompanied by a dull noise. A meteor of the form of an immense globe, which afterwards changed to a train of light and disappeared with an explosion, was observed at the same time.	Ditto, 28 Nov.
— Dec. 9.	Carthagens	An earthquake .....	.....	Two Spanish men-of-war were driven on shore by the sea.	Annual Register, vol. v. p. 76.
— — —	North-west of the chain of the Altai. Felt at the mines of Koliwan, at forts Czagirak and Inesk, at Ust-Kamenogorski, Schoulbinsk, Simpalat, Jamischeff and Barnaoul. The earthquake, therefore, extended about 1000 versts from E. to W., from Barnaoul to Ust-Kamenogorski, and from thence northwards, to Schoulbinsk and Semipalatnaja.	Direction of the earthquake = E. to W., and duration 3 min. at the mines of Koliwan. At Ust-Kamenogorski and all the environs on the Irtisch the duration was 20 minutes. At Schoulbinsk on the Irtisch it lasted 3 or 4 minutes in the direction S. to N. At Simpalat some said the direction was E. to W., others, S. to N. At Jamischeff the shock lasted 12 min., and at Barnaoul its direction was S.W. to N.E.	.....	Preceded by a subterranean noise. At Ust-Kamenogorski the noise appeared to come from the east and to go towards the north. The bastions of the fort of Inesk were violently shaken.	Phil. Trans. loc. cit.
— N.S. Between 7 & 8 P.M.	.....	.....	.....	.....	.....
— 12. About noon.	Ditto	Another shock, as violent, but shorter.	.....	The Annual Register says merely, "Obi in Siberia," but it obviously refers to the same event.	Annual Journ. Encycl. 1 Mai, 1762; Annual Reg. loc. cit.

1.	2.	3.	4.	5.	6.
Jan. 11. Near Montfort l'Amaury Several shocks from the event— (department Seine et Oise) in France.				Preceded by a severe storm during the day	Hist. de l'Acad. de Paris, 1762, p. 36; Coll. Acad. t. xli. p. 45.
— In the district of Albano Tremblings which re- in the Estates of the curial for thirty- Church. four days.				Preuss. Staatszeitung. 1829. No. 170.
March. In Tuscany and the ter- Several shocks. between- ritory of Bologna.				Gazette de France, 16 Avril.
— 16. Wexford in Ireland A strong shock, but of short duration.				Annual Register, vol. v. p. 74; Gazette de France, 9 Avril.
— 20. Shaftesbury in Dorset. One shock. 15 th A.M. shire.				Gazette de France, 16 Avril.
April 2. Throughout Bengal, A very violent earth- Arracan and Pegu, quake. The mo- tion was at first The region especially shaken was the north- gentle, but gra- dually increased, so coast of the Bay of that people walking Bengal, extending could hardly keep from the eastern bank their feet. At Cal- cutta it lasted ten minutes.				Preceded by a rumbling noise. A violent gale the same day threw many ships upon the coast. Accompanied by a very considerable subterranean noise.	Phil. Trans. vol. lili. p. 251; Annual Register, vol. vi. p. 60.
— 9. Kolwanowofreschenko) in Siberia. Lasted about three or four minutes.				Annual Register, vol. v. p. 80.
— 12. Ditto	Ditto.
— In the Mugello in Italy Eleven shocks, of which some were rather violent.				Gazette de France, 3 et 14 Mai; Journ. Encycl. 1 Juin.
— 14. ht of 13 Two slight shocks at Florence, more violent in the Mugello.				Ditto.
— 15. At Florence. Also in the Mugello.				Ditto.

1762. April 17. In the Mugello May 5. Verpillère on the route 9 ^h 28 ^m P.M. from Lyons to Gre- noble.	Another shock..... A shock lasting a mi- nute.	..... At Bergen in Norway, on the 26th of May, the sea ebbcd and flowed with pre- ternatural violence. No earthquake men- tioned.	..... Several houses were thrown down Accompanied by subterranean noise. Animals appeared much frightened, and horses neighed	Ditto. Gazette de France, 24 Mai; Annual Register, vol. v. p. 87.
June 13. Adrianople	A violent shock .....	.....	.....	Gazette de France, 9 Août.
July 13. Calcutta	Two (or three) oscil- latory shocks, last- ing a few seconds.	.....	.....	Ditto, 16 Juillet.
24 P.M.				Phil. Trans. vol. liii. p. 258; Annual Register, vol. vi. p. 61.
23. Arles in France	A slight shock.....	.....	.....	Gazette de France, 6 Août.
7 1/2 P.M.				
Night of 28 to 29.	In the Mugello. In the two islands men- tioned sixty-two were counted, of which some were very violent.	.....	.....	Ditto, 20 et 23 Août.
31. Bonn	One shock, followed at midnight by others lasting 30 seconds.	.....	.....
1 P.M.			On each occasion preceded by subterranean noises.	Ditto, 13 Août.
Aug. 1. Ditto	Two more shocks .....	.....	.....	Ditto.
11 A.M. Brussels	A trembling lasting 10 to 20 secs.	.....	.....	Communication of M. Quetelet to M. Perrey. (See memoir of the latter on earthquakes in France, Holland and Belgium.)
Oct. 6. Rome, Aquila, and the environs.	A violent shock, espe- cially at Aquila.	On the 27th of Septem- ber the Thames rose suddenly in the midst of a dead calm, and dashed the ships violently against one another.	The principal buildings of Aquila were injured. The adjoining village of Poggio-Picenza was entirely ruined.	Gazette de France, 1 et 8 Nov.; Annual Register, vol. v. p. 105.
Nov. 2. At the Dardanelles	Two rather violent shocks.	.....	A terrible storm took place on the 7th, which threw down many houses.	Gazette de France, 14 Janv.; Journ. Encycl. 15 Janv. 1763.
Between 11 and A.M. noon.				

1.	2.	3.	4.	5.	6.
2. Nov. 6. Aquila in Spain	An earthquake			Several houses were thrown down, and the walls of the church cracked from top to bottom.	Annual Register, vol. v. p. 108.
— 8. Jamaica	A violent earthquake			The inhabitants quitted Port-Royal in alarm, but no considerable damage occurred.	Gazette de France, 25 Fév. 1763.
— 13. St. Jago de la Vega	Lasted 15 secs.				Annual Register, vol. vi.
— Dec. 3. Chili	An earthquake		(On the night of the 28th and 29th of December the river Eden in Cumberland, near Armathwaite, fell suddenly 2 feet, and remained so until 11 o'clock the following morning, when the water gradually rose again, though neither rain nor snow had fallen. No shock is said to have been felt.	Accompanied by a volcanic eruption from a mountain near Peteroa, upon which a new crater formed. On a neighbouring height a cleft appeared in the earth of many miles long (?); and a mass of earth slid into the valley of the river Lontue, and thereby obstructed its course for ten days, forming a lake of no inconsiderable magnitude.	Lytell's Principles of Geology, vol. i. p. 438; Malina, Saggio della Storia Nat. del Chili, Bologna, 1810; Biblot. Italiana, vol. i. p. 56; Phil. Trans. vol. lxx. p. 7.
1. Jan. 13. West Nordland in Swe. Earthquake shocks				Accompanied by subterranean noise, a hissing sound in the air, and luminous meteors.	Collection Académique, t. xi. p. 13.
— — — — — Smyrna	A violent shock				Gazette de France, 18 Mars.
— Feb. Be-Bronte and the country round Etna for thirty miles in circumference.	Many shocks, which became more violent daily. One especially so took place on the 6th at night.			Accompanied by an eruption, during which cracks opened in several places in the older lava, and fresh molten matter flowed out. Smoke, ashes and red-hot stones were ejected with the greatest violence from the crater. Towards the middle of the month the violence of the eruption diminished, but before the beginning of March it had not altogether ceased.	Ferrara, Descrizione del Etna, p. 122.
— Mar. 11. Bayonne	A very slight shock				Gazette de France, 8 Avril.
— — — — — 12. Ditto	Another ditto				Ditto.
— — — — — 4 A.M.					

1763. Mar. 13. 1½ A.M.	Pau in the Pyrenees ...	A rather strong shock	.....	Accompanied by a subterranean noise which appeared to come from the Pyrenees.	Ditto.
May 22. 1½ P.M.	Malta	A considerable trembling, lasting 1 min. More shocks, which continued up to the 1st of July.	.....	.....	Journ. Encycl. 1 Juillet.
June 18	Around Etna	.....	.....	The eruption was renewed with great violence, and the volcano remained active for three months, during which time the crater itself was at rest; but huge clefts opened in the earth, from which so much solid matter was ejected, that a new hill, called Monterosso, was formed thereby.	Ferrara, Descrizione, &c. loc. cit.; Gazette de France, 1 et 12 Août.
28. About 5½ A.M.	Hungary. Felt at Comorn, Raab, Pesth, Buda, Kerepas, Temeswar, Belgrade, Schemnitz, Vienna; and extending even to Dresden and Leipzig.	Very violent. At Comorn the first shock took place at 5 A.M., and was followed by another at 5½ 22 ^m or 23 ^m . This second lasted 1¼ min., and was much more violent than the first. At Pesth the first shock at 5 A.M. was slight, but that at 5½ 45 ^m very severe. At Schemnitz shocks were felt at 2½, 5½, and 5½ 28 ^m . At Vienna, at 5½ and 5½ 10 ^m , but slight, as they were also at Dresden and Leipzig. Up to the 4th of July 90 shocks were counted at Comorn.	Two bastions of the fortress of Comorn, on the Danube, were destroyed by the violent agitation of the waters of the river. Water mingled with sand and having a sulphurous odour, were thrown up from the river to the height of 5 feet in jets as large as a man's arm.	The second shock at Comorn was accompanied by a subterranean noise, and did great damage, almost all the buildings being shaken, and several thrown down. At Pesth most of the houses were injured or thrown down altogether. A cross on one of the public buildings, and a large iron bar supporting the arms of Hungary were bent, the latter to the extent of 2 feet. Temeswar and Belgrade also suffered considerably. The earth opened, and an odour of sulphur came out. At Schemnitz it was remarked that the earthquake was not felt at all in the mines. A piece of iron was detached from a magnet here. Violent storms were experienced the day before at Vienna, and on the 30th in Bavaria.	Gazette de France, Juillet et Août; Journ. Encycl. Juillet et Août; Annual Register, vol. vi. p. 83.
July 11. 7½ 32 ^m A.M.	Nîmes in France	A slight shock from W. to E., lasting some seconds.	.....	.....	Gazette de France, 25 et 29 Juillet.
12. 7 A.M.	Avignon, Aix and Tarascon.	A very perceptible shock, lasting 5 to 6 seconds.	.....	Accompanied by subterranean noise	Hist. de l'Acad. de Paris, 1763, p. 19; Coll. Acad. t. xvii. (or xiii.?) p. 85.

1.	2.	3.	4.	5.	6.
3. July 20. Country round Etna .. — 23. Concorn in Hungary ..	Another violent shock. Two more shocks, raising the total number felt there to 110 or 112. Another. Other shocks, were felt, from time to time, at Raab, up to the 4th of Au- gust.			Followed by an eruption the day after	<i>Journ. Mueyol. 1 Août. Gazette de France, &c. as quoted above.</i>
— 29. Ditto. Also felt, at the same time and with equal violence, at Raab.				At Concorn 1500 houses were overthrown, and Ditto. 300 injured.	
- Aug. 9. Raab	Another shock, more violent than any of those felt since the 28th of June. A shock of earthquake At			Houses were thrown down at Raab	Ditto.
— 21. Augusta in Georgia, N. America.			Plymouth (Eng- land), on the 19th, about noon, a sud- den flux and reflux of the tide, like that at the time of the great Lisbon earth- quake, occurred in- ring a tremendous storm of thunder, wind, rain and hail. No earthquake shock mentioned.		<i>Annual Register, vol. vi. p. 96, and for Plymouth, p. 95.</i>
- Sept. 1. One of the Molucca Islands.	The first shock lasted 4 minutes, fol- lowed by seven- teen others during the evening and night. Two feeble shocks, with an interval of half an hour.		At the time of the first. At the same time a neighbouring volcano threw out vast quantities of stones, &c., and subter- ranean noises were heard like the firing of can- non. Great damage was done to the buildings.		Ditto, vol. vii. p. 94.
— 18. In Westrobothnia, Swe- den.			On this day the sea rose suddenly at Wey- mouth to the extent of 10 feet, and fell back as suddenly. No shock spoken of.		<i>Mém. de l'Acad. de Stockholm, 1764, p. 24; Annual Register, vol. vi. p. 98.</i>

1763. Sept. 18. From this time until May 1764.	Mühlhorn in Switzerland. These disturbances were principally felt from the valley of the Linth in the canton of Glaris, by the valley of the Sernf to Mühlhorn, thence by the Wallensee to the Quintenberg, by the upper Toggenburg in the district of Wildhans, and further west through the seigneurie of Sax.	About fifty tremblings during the period referred to, from E. to W.			v. Hoff quotes "Alpina v. Salis u Steinmüller, Th. iii. S. 311."
Oct. 3. About 6 A.M.	Constantinople	A rather energetic shock.			Gazette de France, 28 Nov.; Journ. Encycl. 15 Nov.
11. 8 ^h 15 ^m A.M.	Lisbon. Also at Cadiz at the same hour.	Violent shock at Lisbon, though but feeble at Cadiz.		The Journal Historique records a shock in November, at the same place and hour. It obviously refers to this event.	Gazette de France, 4 et 11 Nov.
30. 4 ^h 15 ^m P.M.	Philadelphia in N. America.	A violent shock		Service was interrupted in the churches, but no damage done. The Hist. de l'Acad. de Paris reports a supposed earthquake at Rousillon in France on the 18th of this month.	Ditto, 9 Janv. 1764.
Dec. 16, 17 & 18.	In Westrobothnia in Sweden.	Twelve shocks were felt.		The earth and houses were distinctly shaken. "A fire in the air" was seen during the earthquake. The following spring, clefts were found in the earth of 2 or 3 Norwegian ells deep, and several hundred fathoms long.	Mém. de l'Acad. de Stockholm, 1764.
23. About 7 P.M.	Constantinople Parish of Logierait in Perthshire.	A considerable shock. An earthquake shock from east to west, of 1 or 2 secs. duration.			Gazette de France, 13 Fév.; Journ. Encycl. 15 Fév., 1764. Thomson's Annals of Philosophy, vol. viii. p. 366.
Jan. 6. 1764.	Bâle	A trembling.		The Gazette de France (20 Fév.) records the fall of a mountain 18 miles from Naples on the 19th Jan. Possibly caused by an earthquake, though none is mentioned.	Merian quotes Prof. d'Annone.
Feb. 14. 7 ^h 4 ^m P.M.	Tripolis in Syria	A rather violent shock, lasting 6 secs.	At Bristol and in the Bristol Channel irregularities were ob-	Some time before a shock had been felt at Aleppo.	Gazette de France et Journ. Encycl. 1 Juin; Phil. Trans. vol. liv. p. 83.

1.	2.	3.	4.	5.	6.
1. May 15.	Corsica in East Bothnia, Sweden, and in the adjoining villages.	A slight shock.	served in the tide on the forenoon of the 11th Feb., but no shock was felt.	Accompanied by a noise like that of a carriage rolling on a pavement.	Gazette de France, 30 Juillet.
19.	Albania in Italy, and the surrounding villages.	One shock.			Ditto, 11 Juin; Journ. Encycl. 1 Juin.
June 4.	On the banks of the Ganges (whereabouts is not mentioned, probably near Calcutta).	Several violent shocks.		Many houses were overturned, and great numbers of men and cattle were killed.	Annuaire, vol. viii. p. 98.
July 3.	Florence.	Two slight shocks.			Gazette de France, 23 Juillet.
21.	Berbec; S. Auencia.	A violent shock of 4 minutes' duration.			Ditto, 23 Nov.
Aug. 16.	Freiburg in Saxony.	A violent shock.		Felt both in the mines and on the surface.	Ditto, 19 Oct.
Oct. 12.	In the Azores.	One shock, from S.W. to N.E.	On the 18th of this month a disturbance of the waters of Lake Erie was observed. No shock mentioned.	Did considerable damage at Foz.	Annuaire, vol. vii. p. 103; Ferrussac, Bull. des Sc. Géol. t. xii. Mai 1858, p. 130.
—	Comarn in Hungary.	Some more shocks during this month.			Gazette de France, 16 Nov.
— or	In the district of the Lower Elbe.	An earthquake.		A space of 30 acres was swallowed up, and a lake of 40 fathoms deep formed in its place.	Journ. Encycl., 1 Déc., quotes "Le Rubrique" of Hamburg of the 30th Nov.
Nov. 6.	At Oxford, and in other parts of Berkshire and Wiltshire.	One shock.		The morning was calm, but, after the shock, the wind became tempestuous.	Cette in Mém. Math. et Phys. préf. à l'Acad., &c. t. vii. p. 475; Annuaire.
Dec.	Peterwaradin in Hungary.	A violent shock.		Some walls were thrown down.	Gazette de France, 11 Fév. 1765.
26.	Lisbon.	An instantaneous, vertical shock, of great violence. Some feeble shocks had been remarked the night before.	The tide was very low at the time, and it was observed that the sea, which before had been quite calm, rose considerably.	Accompanied by a subterranean noise. The weather was bad, thunder, wind and rain prevailing, but for a moment after the shock a sudden calm took place.	The Journ. Hist. Mar., 1765, p. 235; Phil. Trans. vol. iv. p. 45.

1764. Dec. ...	In the country of the Violent shocks	.....	.....	Attended with inundations	Journ. Hist. Fév. 1765, p. 147.
1765. Jan. 6.	Lower Elbe, and in Saxony.	.....	.....	.....	P. Cotte in Mém. Math. et Phys. préa. à l'Acad., &c. t. vii. p. 475; Gazette de France, 11 Fév.
— 13.	Pranden in Austria.....	.....	.....	Each shock accompanied by a noise like the report of a cannon.	P. Cotte, <i>loc. cit.</i> ; Gazette de France, 15 Fév.
— 18.	Sala in the duchy of Parma.	.....	.....	.....	Cotte, <i>loc. cit.</i> ; Gazette de France, 4 Fév.; Journ. Encycl. 1 Fév.
— Feb. 9.	Along the Irtisch in Siberia, especially at the fortress of Jampechew.	.....	.....	Accompanied by a terrible noise	Cotte, <i>loc. cit.</i> ; Journ. Hist. Juillet, p. 65.
— 14.	Abbeville in France, especially from the side of Saint-Valery.	.....	.....	To the north nothing was perceived but a low hollow noise, coming apparently from the sea.	Cotte, <i>loc. cit.</i> ; Gazette de France, 8 Mars.
—	Pistoia and San Geminiano in Italy.	.....	.....	.....	Gazette de France, 11 Mars.
About the middle of the month.	.....	.....	.....	.....	.....
— March 9.	Antigua in the West Indies.	.....	.....	.....	Ditto, 14 Juillet.
— 15.	Island of Dominica.....	.....	.....	More than 150 shocks were reckoned here in February and March. They continued up to the 30th June.	Ditto, 15 Juillet.
and following night.	.....	.....	.....	.....	.....
— 21.	Karlstadt in Wermeland, Sweden.	.....	.....	Accompanied by a noise like that of a carriage.	Ditto, 29 Avril; Journ. Encycl. 15 Avril; Cotte, <i>loc. cit.</i>
7 ^h 40 ^m A.M.	Bermuda	.....	.....	.....	Annual Register, vol. viii. p. 77.
— April 1.	Dominica.....	.....	.....	.....	Gazette de France, 19 Juillet.
— 5.	Limoges and the country round.	.....	.....	The two last shocks accompanied by a prolonged noise like thunder.	Ditto, 19 et 21 Avril; Cotte, <i>loc. cit.</i>
— 8.	Island of Grenada	.....	.....	.....	Gazette de France, 2 Sept.
10 P.M.	Florence	.....	.....	.....	Ditto, 17 Mai; Cotte, <i>loc. cit.</i>
In the afternoon.	.....	.....	.....	.....	.....
— 17.	Genoa	.....	.....	.....	Gazette de France, 6 Mai; Journ. Encycl. 1 Mai; Cotte, <i>loc. cit.</i>
— 20.	.....	.....	.....	.....	.....
— In the afternoon.	.....	.....	.....	.....	.....
noon.	.....	.....	.....	.....	.....
— 22.	Genoa	.....	.....	.....	.....
Between 5 and 6 A.M.	.....	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
May 19. The country on the French side of the Pyrenees.	In the "pays de Foix" one shock lasting nearly two minutes, followed by two other slighter ones ten or twelve minutes after, and by many others for twenty-four hours. At 11 ^h 15 ^m , one shock lasting three seconds was felt at Toulouse; direction = N. to S.	A rather violent shock		Buildings, furniture, &c. were much shaken and injured. The Journ. Encycl. of the 15th July records an earthquake extending seventeen leagues, in the Pyrenees, on the 19th June, at 11 a.m.; but it seems obvious that that of the 19th May is spoken of.	Gazette de France, 31 Mai; Journ. Encycl. 1 Juin; Mém. de l'Acad. de Paris, 1765, p. 23; Coll. Acad. t. xiii. p. 157; Annual Register, vol. viii. p. 89; Cotte, loc. cit.
— 25. (A.M. or L.) Lisbon					Journ. Encycl. 15 Juin.
— d of the nth.	Tiano and Mignano near Naples.	Earthquake shocks ...	At the end of this month the sea suddenly rose 30 feet near Canton in China, and swept away 10,000 of the inhabitants. No earthquake mentioned.	Three houses were thrown down, and two churches much damaged.	Two Annual Register, vol. viii. p. 92.
— June 22.	Jelasjärvi and Umeå in Eastern Bothnia, Sweden.	Two shocks, lasting about a minute.		The Annual Register says at the end of June. Journ. Encycl. 15 Juin; Annual Register, vol. viii. p. 106.	
— 24.	Rocca, Montepiano in the Abruzzo, Italy.	Some shocks felt, probably very slight.		Felt during tremendous rain. On the 24th an enormous rock fell and overwhelmed part of the village.	Gazette de France, 29 Juillet; Journ. Encycl. 1 Août.
	Chieta in the Abruzzo.	An earthquake		Masses of rock fell, and water burst forth. Probably connected with, if not the same as the last account.	P. Cotte, loc. cit.
— 29. July 14.	Trieste, Pites in West Bothnia, Sweden. Also, the same day, at Lulea.	Three shocks. At Pites the shock appeared to come from the west, and		At Pites the windows were shaken, and at Lulea Ditto, 26 Août; Journ. Encycl. 1 Sept.; Annual Register, vol. viii. p. 110; Cotte, loc. cit.	Gazette de France, 9 Août.

1765. July 23. Ditto	At Lulea it was very slight, and apparently in the same direction.	The sea ebbed and flowed more than twenty times in a short space to the extent of 3 or 4 feet.	During a terrible storm of thunder, lightning, and rain. The Annual Register gives the date 26th July, as also v. Hoff, quoting Cotte, who places the earthquake at Lacknau.	Gazette de France, 28 Oct.; Journ. Encycl. 15 Oct.; Annual Register, <i>loc. cit.</i> ; Cotte, <i>loc. cit.</i>
— Ang. ...	A strong shock .....	.....	.....	Gazette de France, 9 Sept.
— In an- turn. ...	An earthquake .....	.....	.....	H. Vogel's Seereisen. Th. 2. S. 151.
— Oct. ...	Several very energetic shocks. ....	.....	.....	Gazette de France, 11 Nov.; Journ. Encycl. 15 Nov.
— Nov. 13. 6 ^h 30 ^m P.M.	A shock .....	.....	Cotte (<i>loc. cit.</i>) reports several shocks at Lisbon on the 13th December. The date must be mistaken for that here given.	Gazette de France, 20 Déc.
1766. Jan. 2. In the Söndmör, Norway.	An earthquake.....	.....	The houses, windows, &c. were shaken	Keilhan's Memoir in the Magazin fur Naturvidenskaberne, <i>loc. cit.</i>
— — 10. Naples	Two slight shocks .....	.....	.....	Gazette de France, 10 Févr.; Cotte, <i>loc. cit.</i>
— — 24. In the Söndmör, Norway.	Another earthquake. ....	.....	Ditto	Keilhan, <i>loc. cit.</i>
— Feb. 2. Rhode Island and Massachusetts in N. America.	An earthquake .....	.....	Accompanied by a remarkable meteor	Silliman's Journal, vol. xxxix. p. 336.
— — 10. In Glamorganshire	A quaking, tremulous motion, lasting eight seconds. ....	.....	.....	Annual Register, vol. ix. p. 65.
— — 11 ^h P.M.	A shock of two minutes' duration. ....	.....	Articles of furniture were thrown down. The Gentleman's Magazine gives the date 28th January.	The Gazette de France, 10 Mars; Gentleman's Magazine, vol. xxxvi. p. 150.
— Between 3 and 4 A.M.	.....	.....	.....	Cotte, <i>loc. cit.</i> ; Gazette de France; Mercure de France; Journ. Hist.; Journ. Encycl., &c., at various dates during this year and the next mention the numerous shocks in the West Indies; Mém. de l'Acad. de Paris; Humboldt, &c.
— Mar. 9. Island of Antigua	A violent shock .....	.....	.....

1.	2.	3.	4.	5.	6.
1766 Mar. 28.	About Vesuvius	Many violent shocks.	.....	Accompanying an eruption of the volcano	Hamilton, Observations on Mount Vesuvius and Mount Etna, London, 1774, p. 5-15; Phil. Trans. vol. lviil. p. 2; Gazette de France, 28 Avril et 16 Juin; Journ. Encycl. 1 Mai.
— April 4.	In Iceland	An earthquake .....	.....	Followed on the 5th by an eruption of Hecla, which lasted until the 16th July. Krafie was also in eruption.	v. Hoff.
— 17.	Island of Grenada	A violent shock .....	.....	.....	Cotte, <i>loc. cit.</i> ; Gazette de France, &c.
— 26.	On the south side of Etna.	Violent shocks, followed by others during the following night and day, and at intervals up to the beginning of June.	.....	Accompanying a violent eruption of the volcano.	Ferrara, Descrizione del Etna, p. 124.
— May 22.	Constantinople. Several other towns also suffered severely.	Violent shocks from S. to N., continuing uninterruptedly for two minutes. They recurred several times during the day, and indeed were felt almost daily up to the 16th June, and at frequent intervals, to the end of that month. Those of the 10th and 14th were the greatest.	The sea was greatly agitated.	Accompanied by a loud subterranean noise in the same direction as the shocks. The damage done to buildings at Constantinople was valued at eleven millions of piastres. v. Hammer, in his History of the Ottoman Empire, (t. xvi. p. 143 of the French translation, quoted by Perrey) gives the date 22nd April. This seems to be certainly a mistake.	Gazette de France; Journ. Encycl.; Journ. Hist. Juillet et Août; Cotte, <i>loc. cit.</i>
— June 11.	Jamaica, especially at Port Royal. Also in Cuba.	In Jamaica a violent shock lasting 1½ minute. In Cuba it lasted seven minutes, and the shocks recurred up to the 14th.	Ships at sea, a league and a half from the coast of Jamaica, rolled so much that their gunwales were immersed in water.	In Cuba many houses were thrown down, but in Jamaica, though greatly shaken, very few fell. The Annual Register gives the date 9th June, but obviously erroneous.	Annual Register, vol. ix. p. 118; Cotte, <i>loc. cit.</i> ; Gazette de France, &c.

1766. July 1.	Constantinople	One shock					Gazette de France; Journ. Hist.; Journ. Encycl.; Juillet et Août.
— 5.	Ditto	Ditto			Accompanied by subterranean noise, and productive of some ruins.		Ditto.
— 8.	Briançon and Mont Dauphin.	Two considerable shocks from N. to S.			Accompanied by noise		Gazette de France, 25 Juillet; Journ. Encycl. 1 Août.
— About 3 P.M.	Constantinople	Another shock					Ditto, and Journ. Hist. Juillet et Août.
— Night between 14 and 15.	Ditto	Ditto; more violent than any of those in this month.			Accompanied by a loud bellowing noise		Ditto.
— Middle of the month. During the night.	S ^{te} Marie in S. America.	Very violent shocks, followed by slighter ones every day up to the 21st.					Gazette de France; Journ. Hist. &c.
— 24.	Island of Cephalonia	A violent shock, lasting three minutes, and followed by three others the same day. The earth trembled more or less for fifty days.					Journ. Encycl. 1 Sept.; Gazette de France, 19 Déc.
— Aug. 5. 6 ^h 50 ^m A.M.	Vienna, and more violently on the frontiers of Hungary, and at S ^{te} Marguerita. Also at Constantinople, in Turkey and Asia Minor, one very violent shock (the most so since the 22nd May), which lasted 40 seconds at Constantinople, and was there succeeded by two others at 8 ^h and 10 P.M. From the 5th to the 16th the shocks occurred daily at Constantinople, and were very frequent up to the 23rd.				At Constantinople fresh ruins were produced among the houses and mosques. At Adrianople also houses were thrown down, and the other towns mentioned suffered more or less injury. The Journ. Hist. and Annual Register give the date 8th Aug.		Gazette de France; Journ. Encycl. Août et Sept.; Journ. Hist. &c.
— Half an hour after noon.							

1.	2.	3.	4.	5.	6.
Aug. 6. Padua 30 ^m (Ita. time).	One shock	One shock			Toaldo, <i>Basa Météor.</i> p. 270.
— In the margrave of Ancona.	Several shocks	Several shocks			<i>Journ. Encycl.</i> 15 Août.
— 13. Island of Martinique in the West Indies.	An earthquake	An earthquake			<i>Gazette de France; Journ. Hist. &c.</i>
— 16. Vienna. 25 ^m P.M.	A considerable shock, of five or six seconds' duration.	A considerable shock, of five or six seconds' duration.			The Ditto; <i>Annual Register</i> , vol. ix. p. 136.
— 17. Ditto. Also felt at Presburg.	A second, and less violent shock.	A second, and less violent shock.			Ditto.
— 25. Newport (the capital of Rhode Island) in America.	A violent shock, lasting twenty-five seconds.	A violent shock, lasting twenty-five seconds.			<i>Gazette de France, 7 Nov.</i>
— Martinique in the West Indies.	Another and very violent shock.	Another and very violent shock.			<i>Gazette de France; Journ. Hist. &c.</i>
Sept. 5. Constantinople. All these shocks at Constantinople were scarcely perceptible at Smyrna, but extended to Vienna on the other side.	Another rather considerable shock, followed by slight ones up to the 24th, when they appeared to have ceased for a month.	Another rather considerable shock, followed by slight ones up to the 24th, when they appeared to have ceased for a month.			<i>Gazette de France, 24 Oct. et 17 Nov. Journ. Encycl.</i> 15 Sept. 1 et 15 Oct.
— 18. Guadaloupe in the West Indies.					<i>Gazette de France; Journ. Hist. &c.</i>
— 23. Lyons. Also observed at the château de Filcheres, at la Croix-Rousse, St. Just, and other places in the environs.	A feeble trembling motion.	A feeble trembling motion.			An extract from the registers of the observatory of Lyons, communicated by M. Ang. Bravais to M. Perrey. Also a communication of M. P. de Lacroux to the same.
— Cuba	An earthquake.	An earthquake.			<i>Annual Register</i> , vol. ix. p. 142.
— 1 of the 11th.					The city of St. Jago was overturned.

1766. Aug. From this month until the new year.	Albano in Italy	Shocks recurred daily.	M. Percy says that he can find no account of these shocks in any of the journals of the day.			
— Oct. 6.	Island of St. Eustache in the West Indies.	An earthquake.	Accompanied by a hurricane, according to Cotte. <i>Gazette de France</i> ; Journ. Hist. &c.; Cotte, <i>loc. cit.</i>			
— 21.	Cumana and Caraccas in New Granada, South America. Also the racas they recurred island of Trinidad. <i>hourly</i> (probably only Also at Surinam, and at first) for 14 months; indeed all the north-up to the end of 1767. eastern portion of S. According to tradi- tion, the shocks were simple horizontal os- cillations. At Surinam there were two other violent shocks felt be- sides the one here mentioned, viz. on the 24th at midnight, and 27th at 7 A.M.	Very violent shocks. In the territory of Ca- casney, two leagues to the east of Corisco. The inhabitants lived in the streets for the two years, 1766-67. The Indians celebrated by feasts the approaching destruc- tion and subsequent regeneration of the world. During these shocks a little island in the Ori- noco sank and disappeared beneath the waters, and in many places disturbances of the surface were produced. The first and third of the shocks at Surinam were attended with sub- terranean noise, as were the shocks at the mission station of Macaramado.	The whole city of Cumana was ruined. Erup- tions of sulphurous water frequently occurred, especially about Casaney, two leagues to the east of Corisco. The inhabitants lived in the streets for the two years, 1766-67. The Indians celebrated by feasts the approaching destruc- tion and subsequent regeneration of the world. During these shocks a little island in the Ori- noco sank and disappeared beneath the waters, and in many places disturbances of the surface were produced. The first and third of the shocks at Surinam were attended with sub- terranean noise, as were the shocks at the mission station of Macaramado.			<i>Gazette de France</i> ; Journ. Hist. &c.; Humboldt. Voyage, &c. (octavo), t. i. p. 307., t. ii. pp. 23 to 274, t. v. p. 56; Gill, Saggio di storia Americana, t. ii. p. 6.
3 A.M.						
— 24.	Constantinople	Another shock, lasting twenty seconds.				<i>Gazette de France</i> ; Journ. Encycl. &c.
7 A.M. Nov. 9.	Ditto	Another rather enor- getic shock.				<i>Gazette de France</i> , 12 et 29 Déc. et 16 Janv. 1767; Journ. Encycl. 15 Janv.; Mercure de France, Fév. 1767.
5 A.M.						Ditto.
6 A.M.		Ditto, followed by others up to the 1st December.				
— Dec. 12.	Charleston in S. Carolina Martinique	A slight shock.	Accompanied by a meteor.			Silliman's Journal, vol. xxix. p. 336. <i>Gazette de France</i> ; Journ. Hist. &c.
5 A.M. — 17.	Portsmouth, and many adjoining places in New Hampshire, N. America.	A violent shock	Attended by a rumbling noise. The weather very calm and serene. No damage was done.			Annual Register, vol. x. p. 52; <i>Gazette de France</i> , 6 Mars, 1767.
6 ^h 49 ^m P.M. (According to the <i>Gaz.</i> de Fr. the day was the 15 th at 6 ^h Dec. 17 th .)						

1.	2.	3.	4.	5.	6.
Jan. 12. at be- en 18 19. A.M.	In the Caucasus Constantinople Bielefeld in Westphalia. One shock	An earthquake A rather violent shock The shock		The spire of a minaret, which was just repaired, was thrown down.	Keferslein. Gazette de France, 27 Fév.; Journ. Encyl. 1 Mar. Gazette de France, 9 Fév.; Cotte, loc. cit.
19. A.M.	Hamelin (in the basin of the Weser), and Hanover	At Hameln, one shock but a few instants, and was so slight as to be perceptible only in the upper stories of the houses.		After the shock the wells at Hameln in which there had been no water were suddenly filled. The weather was excessively cold. The Annual Register gives the date 22nd January for Hanover.	Gazette de France; Journ. Encycl. Fév.
20. A.M.	Lipstadt, Rithberg, Gutersloh, Hordorf, Munster, Osnabruck, and Paderborn.	At Lipstadt the shock was from W. to E., and lasted a few seconds.	The ice on the Lippe was cracked in many places.	Doors were burst open at Lipstadt	Annual Register, vol. x. p. 50; Gazette de France, 6, 16, et 20 Fév.; Journ. Encycl. 15 Fév.
21. 30 ^m and 19 ^m A.M.	Parma. Also at Pisa	Two shocks at Parma at the times mentioned, each lasting two seconds. They were more violent at Pisa, and had been preceded by some slighter ones.			Gazette de France, 9 et 20 Fév.; Cotte, loc. cit.
reen the and the February.	Finizzano in Tuscany	Thirty-six shocks were felt in this space of time.		Great damage was done to the buildings	Annual Register, vol. x. p. 67.
22. February.	Genoa	Three successive shocks felt, succeeded by slight tremors for some time.		In all probability this account, with those of the 19th, 20th, and 21st, all refer to the same earthquake, and thus the dates are erroneous. Parry, however, does not seem to think so.	Ditto.
at the of the 11th.	Naples, and about Vesuvius.	Some slight shocks.		Was appeared on the summit of Vesuvius on the 1st February.	Gazette de France, 23 Fév.; Hamilton.

1767 Jan. 30. 5 ^h 30 ^m P.M. Night between 31 and Feb. 1.	Constantinople Kisliar in the province of Dagostan, Caucasus.	A violent horizontal shock. Two shocks, the first lasting one minute, the second twenty seconds.	..... Several people were thrown down by the mo- tion.	Journ. Encycl. 15 Mars; Gazette de France, 20 Mars. Journ. Encycl. 15 Avril.
— Feb. 7. About 4 or 5 A.M.	Genoa and Turin, and indeed perceptible all through Lombardy.	At Genoa and Turin some rather violent shocks, lasting 30 seconds.	.....	Gazette de France, 23 Fév., 16 Mars; Annual Register, <i>loc. cit.</i>
— About same day.	Island of Scio	An earthquake.....	Probably occurred at the same time with that next mentioned.	Annual Register, <i>loc. cit.</i>
— 8 A.M.	Constantinople	A rather violent shock, lasting as long as that of the 30th January. Slight shocks were felt up to the 16th.	.....	Gazette de France, 27 Mars; Journ. Encycl. 1 Avril.
— 9 4 A.M. (Ac- cording to the Annual Register, 4 ^h 15 ^m .)	Grasse in France. Felt also more strongly at Nice, Genoa, and espe- cially at Venice.	Three considerable shocks, of which the first, the most violent one, lasted a few seconds, the others not so long.	During the shock a sound was heard like that of a gust of wind.	Annual Register, vol. x. p. 78; Gazette de France, 9 Mars.
— 24. Mar. 17.	Naples .....	.....	.....	Gentleman's Magazine, vol. xxxvii. Gazette de France, 20 Avril; Journ. Encycl. 15 Avril; Cotte, <i>loc. cit.</i>
— 26. 4 ^h 30 ^m A.M.	Comorn in Hungary ...	A violent shock	The inhabitants quitted the town	Gazette de France, 11 Mai.
— 30. A little after midnight (of the 29th?).	Constantinople	Two more shocks .....	.....	Ditto.
1 ^h 30 ^m A.M. 2 A.M.	Ditto	Another, as violent as the first.	.....	Ditto.
— April 7. 1 ^h 30 ^m A.M.	At Bourgneuf (départ. Loire-Inférieure). Also at Nantes.	At Bourgneuf a vio- lent shock. At Nantes the shock was but slight.	Accompanied at Bourgneuf by noise in the direction E.S.E. to W.N.W. Half an hour after a loud clap of thunder where the noise of the earthquake appeared to end. At Nantes the sound was like that of a chariot. There had been a high wind there the evening before.	Ditto, 17 Avril et 15 Mars.

1.	2.	3.	4.	5.	6.
Apr. 13. Gotha. Also at Cassel, Göttingen, Hildesheim, and Mühlhausen. Also the same day, at Rothemburg, and along the Fulda and Wertheim.	At Göttingen two shocks at the hours mentioned, of which the first only was felt at Cassel. At Rothemburg three violent shocks were felt (hour not mentioned).	At Göttingen two shocks at the hours mentioned, of which the first only was felt at Cassel. At Rothemburg three violent shocks were felt (hour not mentioned).	At the moment of the first shock an oblong sulphurous cloud was observed at Vögelshausen on the side of Cassel. At Sondera (two miles from Göttingen) a noise like the report of a cannon was heard. At Rothemburg chimneys were thrown down.	Gaz. de Fr., 1. 8, 25, 29 Mai; Journ. Encycl. 15 Mai; Mercure de France, Octobre; Poggenhoff's Annalen, B. 19. a. 473; Cotte, loc. cit.	
15. Gernsheim in Hesse-Darmstadt.	Two smart shocks.	Two smart shocks.	Accompanied by a subterranean noise lasting one minute for each. On the 11th the thermometer had suddenly fallen 9°, in the evening it was very variable, and at 10 p.m. a violent wind arose, which lasted only five minutes.	Gazette de France, 15 Mai.	
20. In different places to the west of Stirling, Scotland.	A slight shock.	A slight shock.		Ditto, 22 Mai.	
21. Surinam. Also in Martinique and Barbadoes.	At Surinam several shocks, of which two were rather violent. In Martinique also the shocks were violent. One particularly so was felt there about 7 a.m. in the mountains which separate the waters of the Oyapoc from those of the Marony.	At Martinique and Barbadoes the sea was much agitated, and ebbed and flowed in an unusual way.	The Journ. Hist. erroneously gives the date 14th April for Martinique.	Ditto, 17 Juillet, 4 et 21 Sept.; Journ. Hist. Oct. p. 318; Gentleman's Magazine, vol. xxxvii. p. 325.	
May 26. In the neighbourhood of Sandemir, Mimoroca, and Lalyzew in Poland.	An energetic shock.	An energetic shock.		Gazette de France, 10 Juillet.	
27. Turin and the valley of Lanzo.	At Turin some slight shocks; more violent ones in the valley of Lanzo.	At Turin some slight shocks; more violent ones in the valley of Lanzo.	Some buildings were injured in the valley of Lanzo. It was reported that the little hill of S ^{te} Christina was seen to reel (chanceler) and smoke. The following day at 3 p.m. two villages of this district were struck by lightning.	Journ. Hist. Août, p. 153.	

of the month.	of the year.			
4. Rome. Also at Spoleto. About 6 P.M.	A violent shock. At Spoleto several others were felt.	Houses were thrown down at Spoleto	Gazette de France, 29 Juin; Journ. Encycl. 15 Juin et 1 Juillet; Cotte, <i>loc. cit.</i>	
22. Cologne and throughout the province of Cleves. Also felt at Sedan and Bouillon.	A violent shock .....	.....	Gazette de France, 3 et 17 Juillet; Journ. Encycl. 15 <i>Juin</i> (the num- ber did not appear until July ac- cording to M. Perrey); Cotte, <i>loc. cit.</i>	
July. Night of 14 to 15.	Several violent shocks from W. to E., fol- lowed by others up to the 18th.	Great damage done to buildings, &c. Cosenza, Luzzi, S ^{ta} Agatha, &c. suffered extremely. Forty persons were killed. An eruption of Vesuvius began on the 7th August.	Annual Register, vol. x. p. 125; Journ. Hist. Sept. p. 230.	
End of the month.	Violent shocks	S ^{ta} Maura was much injured	Journ. Encycl. 15 Sept.	
Aug. 24. Ditto	Ditto	Many of the inhabitants swallowed up, and almost all the buildings ruined. Very probably the last account refers to this event.	Annual Register, vol. x. p. 123.	
Sept. 2. Spoleto	Seven more shocks... On the 5th September at between 7 and 8 P.M., the sea at Ost- end, and the Liffey at Dublin, ebbed and flowed suddenly and violently to the extent of 4 or 5 feet. No shock is men- tioned.	Vesuvius continued in eruption.....	Journ. Encycl. 1 Oct.; Annual Register, vol. x. p. 126-7.	
11. Constantinople	Two slight shocks .....	.....	Gazette de France, 26 Oct.; Journ. Encycl. 1 Nov.	
14 and 5 A.M.	Three considerable shocks in the space of a minute.	Each shock preceded by a noise, which appeared to come from the earth.	Keilhan's Memoir, <i>loc. cit.</i>	
Night of 22, 23.	More shocks	On the 28th a hurricane unroofed almost all the houses.	Gazette de France, 26 Oct.; Journ. Encycl. 1 Nov.	
26 and 27.				

1.	2.	3.	4.	5.	6.
Oct. 19. 2.	About Vesuvius, and as far as Naples.	Numerous and violent shocks.		Accompanying a violent eruption of the volcano, which did not entirely cease until the 27th. At Naples explosive noises were heard, and doors and windows opened of themselves. On the 13th and 14th there had been heavy rains.	Gazette de France, 16 Nov.; Journ. Encycl. 15 Nov.; Codi. Acad. t. xiv. p. 79; Journ. Hist. Déc. p. 473; Phil. Trans. vol. lviii. p. 1. vol. liz. p. 18; Hamilton, Observations, &c., pp. 19-44; Hamilton, Campi Flegrei, pp. 22-32. Annual Register, vol. x. p. 142.
— of the ith.	Cephalonia and Zante ..	A very violent shock, preceded by others less so.		Montgomery Martin (Hist. of the Brit. Col. vol. v. p. 431.) mentions an earthquake of great violence in Zante during this year, without giving the month or day. He doubtless alludes to this event.	Gazette de France, 28 Déc. Ditto, 18 Déc.; Journ. Encycl. 15 Déc. Ditto.
Nov 13. — 20. — 21. — 22. 10 th P.M.	Constantinople .. Strassburg in Carinthia. Clagenfurt in Carinthia. Macao in China	A moderate shock .. A shock of 7 seconds' duration. A rather energetic shock. A trembling motion, which lasted about a minute. Followed by a second, of less violence at 11 ^h 5 ^m , and by a third and pretty strong one at 3 A.M. on the 23rd. Altogether five shocks were reckoned, of which the first was the most violent.	The ships lying in the harbour experienced the motion.	The first shock was strong enough to shake a house violently. A rolling noise and heavy gusts of wind were observed.	Phil. Trans. vol. liz. p. 71.
— 23.	Clagenfurt in Carinthia. Also felt at Gratz, and in Styria.	Two other shocks, less violent than the former.	On the 28th November at 5 A.M., the tide at London ebbed and flowed twice in an hour and a half. No earthquake mentioned.		Gazette de France and Journ. Encycl. loc. cit.; Annual Register, vol. x. p. 151.
Dec. 8.	The island of Ponio, Neira, belonging to the Banda group.	An earthquake			Vogel's Secretien, Th. 2. s. 178.

1768. Jan. 3. Between mid- night (of the 2nd) and 1 A.M.	Crick in Northamptonshire, and other places near.	Lasted 14 minute				Annual Register, vol. ii. p. 59.
— — — 21. 6 ^h 30 ^m P.M.	Cap Français in St. Domingo.	A slight shock from W. to E.				Gazette de France, 27 Mai.
— Feb. 27. 2 ^h 45 ^m A.M.	Vienna. Also at Neustadt, Presburg, Bischoffswerder in Lusatia, and Freiberg.	At Vienna a rather violent shock from N.E. to S.W., lasting eight seconds. At Presburg the shock was less remarkable, and at Bischoffswerder and Freiberg it was very slight.	At Presburg the inundations were considerable.	The Annual Register gives the date, the 26th for Vienna, and says that it was there imagined that the earthquake originated in Italy. At Neustadt houses were thrown down, and in the mountains around Freiberg clefts opened in various places.		Annual Register, vol. ii. pp. 75 and 85; Gazette de France, 14 et 18 Mars; Journ. Encycl. 15 Mars.
— March 5. 9 ^h 30 ^m A.M.	Vienna and the neighbourhood.	More shocks				Gazette de France; Journ. Encycl. loc. cit.
— — — 18. (O.S.) 4 A.M.	Irkutsk and Selinginsk in Siberia.	A slight trembling				Pallas, Voyage, &c. t. iv. p. 394.
— April 3.	Pan in the Pyrenees	A violent trembling for one minute.		v. Hoff, quoting Cotte, gives the date 13th April, and adds in a note that Palassou does not mention this earthquake.		Gazette de France, 18 Avril; Cotte, loc. cit.
— — — 25. — — — 30.	At L'Orient in France. Naples. Felt more perceptibly in several other parts of Italy.	An undulatory shock. A slight shock.		Followed on the side of Vesuvius by a considerable subterranean noise for two days.		Cotte, loc. cit. Gazette de France, 30 Mai, 10 Juin; Cotte, loc. cit.
Between 6 and 7 P.M.	Parma	Some slight lateral shocks.				Gazette de France, 23 Mai; Cotte, loc. cit.
— May 4.	Newcastle, Manchester, Darlington, Kendal, and some places in Yorkshire.	Two shocks with an interval of half a minute. Direction supposed to be E. to W. One shock lasted nearly two seconds.	At Kendal a rumbling noise was heard before the shock, like the sound of a heavy carriage on rough ground. At Manchester some walls were moved in a right line, and the flagging of a kitchen was observed to heave. In York-shire a prolonged noise like thunder was heard.			Annual Register, vol. xi. p. 114; Cotte, loc. cit.; Gazette de France, 30 Mai et 6 Juin.
— 15. 4 ^h 15 ^m P.M.	Genoa	A trembling				Gazette de France, 10 Juin; Journ. Encycl. 15 Juin.
— 19. Beginning of the night. June 9. 30 ^m P.M.	Lisbon	Several violent shocks, said to be from N.E. to S.E.	Accompanied by subterranean noise			Gazette de France, 11 Juillet; Journ. Encycl. 15 Juillet; Cotte, loc. cit.

1.	2.	3.	4.	5.	6.
June.... try pro- sily same (as last.)	Gibraltar.....	A violent shock .....	.....	.....	Gazette de France, 4 Juillet.
Aug. 3. Irkutsk and Selinginsk. Another slight trem- S.) 2 P.M. in Siberia. bling.	Pallas, Voyage, &c. t. iv. p. 394.
Oct. 5. Constantinople	A trembling .....	.....	.....	Rensudot, Annales Périodiques.
— 12. Ditto	Another slight trem- bling.	.....	.....	Ditto.
— 19. Florence, and the coun- A rather violent try round. Also at Padua. shock preceded by a slighter one, and followed by a third at 2 A.M. on the 20th.	Gazette de France, 18 et 21 Nov.; Journ. Encycl. 15 Nov.; Toulou, loc. cit.; Cotte, loc. cit.
Nov. 30. Castel, Fiorentino, Mon- tale, and Gombassi in Italy.	Very smart shocks .....	.....	.....	Gazette de France, 19 Janv.; Mer- cure de France, Fév. 1769.
Dec. 1. Ditto	More shocks .....	.....	.....	Ditto.
— 21. Santa-Sofia in Tuscany. Two shocks, of which the second was the more violent.	Annual Register, vol. xi. p. 195.
— 21. Worcester, Gloucester, A violent shock of many other parts of England, and in the mountains of Scot- land.	Annual Register, vol. xi. p. 201; Gazette de France, 13 Janv.; Mercure de France, Fév. 1769.
— 29. Bytown in Hereford- shire.	Apparently from E. to W.	.....	.....	Gentleman's Magazine, vol. xxix. p. 80; Gaz. et Merc. de Fr. loc. cit.; Hibbert, Description of the Shetland Isles, p. 386.
.....	During this year the sea was turbid off the Shetland Isles, and dead fish rose to the surface, phe- nomena ascribed by v. Hoff to submarine volcanic action.	.....	.....	.....

1769. Jan. 1. Florence	Violent shocks.	.....	.....	.....	Renaudot, Annales Périodiques.
8. Padua	One shock	.....	.....	.....	Toaldo, Essai Météor. <i>loc. cit.</i>
9 o'clock (Italian time).		.....	.....	.....
Feb. 5. Neustadt near Vienna	Ditto	.....	.....	.....	Gazette de France, 3 Mars.
6. Lisbon	A trembling	.....	.....	.....	Renaudot, Annales Périodiques.
2 ^h 30 ^m P.M.		.....	.....	.....
20. Constantinople	A violent shock	.....	.....	.....	Gazette de France, 21 Avril; Journ. Encycl. 15 Avril.
8 ^h 30 ^m A.M.		.....	.....	.....	Toaldo, Essai Météor. <i>loc. cit.</i>
Mar. 8. Padua	Another shock	.....	.....	.....
8 o'clock (Italian time).		.....	.....	.....
May 1. Bagdad	Several shocks	.....	.....	.....	Journ. Hist. Déc. p. 474; Gazette de France, 3 Nov.; Richard, Hist. des Météores, t. viii. p. 504; Cotte, <i>loc. cit.</i>
2 P.M.		.....	.....	.....	Gazette de France et Journ. Encycl. 15 Août; Cotte, <i>loc. cit.</i>
Aug. 4. Angsburg, Nuremberg, Gunzburg, Ulm and Fischler.	Violent shocks for seventeen minutes.	.....	.....	.....	Toaldo, Essai Météor. <i>loc. cit.</i>
19. Padua	Another shock	.....	.....	.....
19 ^h 45 ^m (Italian time).		.....	.....	.....
Oct. 24. Irkutsk (N.S.) 7 P.M.	Two violent shocks from S. to N.	.....	.....	.....	Gazette de France, 26 Fév.; Journ. Encycl. 1 Mars, 1770; Pallas, <i>loc. cit.</i>
Nov. Middle of the month.		.....	.....	.....	Annual Register, vol. xii. p. 155.
4 A.M.	Violent shocks from S. to N. and N. to S., lasting 1½ minute.	.....	.....	.....	Gazette de France, 15 Déc.; Richard, Hist. des Mét. t. viii. p. 505.
Dec. 1. Paris, St. Cloud, Montmorency, Versailles, Elbeuf, Dieppe, Rouen, and Houlme, a village near Rouen.	A violent shock. At Houlme (one league from Rouen) two smart shocks were felt at the hour mentioned.	.....	.....	.....	Hist. de l'Acad. de Paris, 1769, p. 23; Cotte, <i>loc. cit.</i> ; Gazette de France, 8 et 15 Déc.; Journ. Encycl. 15 Déc.; Coll. Acad. t. xiv. p. 124; Richard, Hist. des Mét. t. viii. p. 506.
A little after 6 ^h P.M. (at Versailles).		.....	.....	.....
6 ^h 36 ^m.		.....	.....	.....
10 ^h P.M.		.....	.....	.....

1.	2.	3.	4.	5.	6.
1769.	Island of Zante	A violent shock .....	.....	It is doubtful whether this event is not the same with that of 1767.	Montgom. Martin, <i>loc. cit.</i>
.....	Syracuse	An earthquake .....	.....	.....	Keferstein.
1770. Jan.	Messina	A violent shock .....	.....	Belfries were injured	Journ. Encycl. 1 Mars.
Beginning of the month. ....	.....	.....	.....	.....	.....
— End of the month.	S ^{ta} Maura, one of the Grecian islands.	A violent earthquake. ....	.....	Seven hundred houses were destroyed, and many of the inhabitants buried under the ruins.	Annual Register, vol. xiii. p. 69; Journ. Encycl. 5 Fév.
— Feb. ...	In Calabria, at Reggio, and also in Sicily.	An earthquake. ....	.....	.....	Phil. Trans. vol. lxxiii. p. 196.
— Mar. 20. Bâle .....	.....	A trembling. ....	.....	.....	Merian quotes the Meteorological Register of d'Annone.
— May 26. Lisbon .....	.....	One shock .....	.....	Followed by a subterranean noise	Renaudot, Annales Périodiques.
6 A.M. ....	.....	.....	.....	.....	.....
— June 3. In the western part of St. Domingo, especially at Port-au-Prince. ....	.....	A violent earthquake. The first shock (at 7 ^h 3 ^m) was from E. to W., and lasted 3 minutes. The other shocks (which continued at Port-au-Prince for four hours) were in all the various directions of the compass. The most severe lasted 2 ¹ / ₂ minutes. Only four were felt at Cape Nicola Mole. The shocks were felt in the other parts of the island but feebly, but at Port-au-Prince they continued almost uninterrupted until the 5th.	The sea inundated the country to the distance of a league and a half from the shore.	All the buildings at Port-au-Prince and many other places were destroyed. A river was completely choked up in one place, and in another a small volcano made its appearance. A noise like that of a cannon fired amongst hills was heard. Immediately before the shock a water barometer fell 2 ¹ / ₄ inches = 2 lines of the mercurial barometer. Great clefts opened in the earth in various places, from which mephitic vapours came and produced an epidemic. Hot springs also appeared, but ceased to flow after some time. On the 6th a violent hurricane occurred at Charleston.	Annual Register, vol. xiii. p. 130; Vivenzio (1788), p. 22; Humboldt, Voyage, t. ii. p. 285; Cotte, <i>loc. cit.</i> ; Essai sur l'Hist. Nat. de l'Isle de St. Domingo, Paris, 1776; Gazette de France, 3 et 10 Août; Journ. Encycl. Août; Mercure de France, Sept.; Renaudot, Ann. Périod.; Richard, Hist. des Mét. t. ix. p. 419; Journal des Mines, No. 18. pp. 49 et 54.

1770. June 3. Reggio in Calabria, Messina, Arpino, Sora, Peperno, and several other places in the Terra-di-Lavoro.	Shocks at Reggio almost daily during this period. At Messina 30 shocks in a space of eight days. In the Terra-di-Lavoro but one shock.			Gazette de France, 30 Juillet; Journ. Encycl. 1 et 15 Août; Renaudot, Ann. Périod.
10 ^h 58 ^m 45 ^s . (A.M. or P.M.?)	9. At Cologne. Also felt at Maestricht.	Reiterated shocks for fourteen to sixteen seconds at Cologne. At Maestricht but one shock.		Gazette de France, 25 Juin.
— July 22. Messina				Annual Register, vol. xiii. p. 145.
— 29. Belley, Bourg, Lyons, Mont d'Or, Geneva, and Grenoble.	Two or three shocks of thirty seconds, in two parallel directions from E. to W.	There was much rain during the month, so that almost all the rivers had inundated their banks.		Gazette de France, 17 Août; Register of the Observatory of Lyons, communicated to M. Perrey by M. Aug. Bravais. Communication of M. P. Lacroix to the same; Cotte, loc. cit.
— Aug. 14. Constantinople	Two shocks from N. to S. (Renaudot, Ann. Périod. gives the opposite direction.)			Gazette de France, 8 Oct.
— Oct. 9. Lyons, la Claire, Balmont, and Ambérieux (Bugy).	More slight shocks, less perceptible at Lyons than at the other places mentioned.			Register of the Observatory of Lyons, communicated to M. Perrey by M. Aug. Bravais.
— — — — —	Bâle			Cotte, loc. cit.
— — — — —	Sora in the Terra-di-Lavoro, Italy.			Gazette de France, 30 Nov.; Journ. Encycl. 1 Déc.
Day not mentioned.	In the Voigtland, Saxony; at Plauen and the adjoining villages, Adorf and its territory, Brunebach, Schomberg, Egra.	It was remarked that the shocks appeared to go from Plauen to Adorf at first, and afterwards seem to take the opposite direction; that they were felt sometimes in the midst of a storm, sometimes in a perfect calm; and that they were sometimes unaccompanied by any noise, whilst on other occasions they were preceded, accompanied or followed by a terrible noise.		Gazette de France, 21 et 28 Déc., 4 Fév.; Journ. Hist.; Fév. 1771; Journ. Encycl. 15 Déc.

1.	2.	3.	4.	5.	6.
Nov. 3. Schomberg in the same region.	The shocks recurred after an interval of quiet, and continued almost all the rest of the day. At 10 p.m. they became more violent.			Accompanied by a subterranean noise, which, with the shocks, became more violent at 10 p.m. Some persons were crushed in attempting to escape from a church.	Gazette de France, 21 et 28 Déc., 4 Fév.; Journ. Hist. Fév. 1771; Journ. Encycl. 13 Déc.
— Planen in the same region.	The shocks recurred here also, followed by others at 4 a.m. on the 11th.			Accompanied by a dull noise like that of a Ditto. heavily laden carriage.	
— Johann-Georgenstadt in Saxony also.	An earthquake			Followed by storms which did not cease for more than a month.	Ditto.
Dec. 6. Lintz on the Danube	A rather energetic shock.				Gazette de France, 28 Déc.; Journ. Encycl. 1 Janv. 1771.
— 27. Florence	A violent shock, followed by some others less considerable.			Some houses and villas were thrown down	Gazette de France, 25 et 28 Janv.; Journ. Encycl. 15 Janv. 1771.
— Sienna in Tuscany	A trembling				Merian quotes d'Annonde's Meteorological Register.
At sea, on board a vessel which had left Lisbon the day before.	Lasted two or three minutes.			The cannon were shaken	Féruac, Bull. des Sc. Nat. t. ix. p. 21.
Jan. 4. Johann-Georgenstadt	A violent shock, followed by two others in the space of a quarter of an hour.			The men at work in the mines perceived a disturbance, and heard a noise which they took for a signal.	Gazette de France, 4 Fév.
— 5. Ditto	Another shock				Ditto.
— 8. Leghorn	The first of a series of violent shocks, which lasted until the 25th of this			The inhabitants were much alarmed, the churches were kept open night and day, and all the theatres were closed.	Ditto, 8 Fév.; extract from the Manuscript Journal of Leghorn, of Bernardo Frako, t. i. p. 171 (communicated by Signor Fils)

1771. Jan. 12. District of Belluna in the Venetian territory.	month. One on this day, at 4 ^h 15 ^m A.M., was very violent.	.....	Part of a mountain rolled down, being detached by these shocks.	to M. Perrey); Cotte, <i>loc. cit.</i>
— 15. Leghorn	Several shocks.....	.....	.....	Gazette de France, 18 Fév.; Journ. Encycl. 15 Fév.; Cotte, <i>loc. cit.</i> Bernardo Prato's Journal, <i>loc. cit.</i>
— 28 Albe (in Italy)	The two most violent shocks of the period occurred on this day. The motion of the earth was felt, though feebly, until the 20th March.	.....	The shocks occurred in all states of the barometer, which varied $\frac{1}{4}$ or $\frac{1}{2}$ in. during the time.	Vassali-Eandi, Rapport, <i>loc. cit.</i> p. 128.
— Feb. 1... Luçon in the Philippine Isles.	Daily shocks during this period, some of them very violent.	.....	Did great damage, especially at Hermita near Manilla.	Aragon, Descripc. Geogr. y Topogr. de la Yala de Luçon, Manilla, 1819, t. ii. p. 19.
— Martinique	An earthquake .....	.....	Did some damage to St. Pierre, Fort-Royal, and in various houses.	Gazette de France, 6 Mai; Journ. Encycl. 1 Mai.
During the first half of the month.	One shock .....	.....	.....	Ferrara, Campi Flegrei, pp. 233 and 234.
— 17. Island of Vulcano (one of the Lipari group).	The island was violently shaken.	.....	The day before, the barometer fell half an inch, and the wind blew strongly from the south all night. Snow fell in the morning, and very cold weather set in, which lasted until the 3rd of March. At Semenofsköi the shock was felt as well in the mines as on the surface. At Schlangenbergit was not perceived in the mines.	Pallas, Voyage, &c.; Trad. de Gauthier de la Feyronie, t. iii. p. 342.
— 18. Schlangenbergit, Semenofsköi, Kouznetzkoï, and over the whole extent of the Altai chain. Not felt beyond Schlangenbergit.	A rolling motion from S. to N., but feeble at Schlangenbergit. At Semenofsköi, however, it was very violent.	.....	.....	Gazette de France, 19 Avril; Cotte, <i>loc. cit.</i>
— Mar. 20. Florence	A slight shock.....	.....	.....	Ditto.
— 9 P.M. — 21. Ditto	Ditto .....	.....	.....	Toaldo, <i>loc. cit.</i>
— 5 A.M. April 3. Padua	One shock .....	.....	.....	.....
— 7 o'clock (Italian time). — 29. Abingdon in Berkshire	A momentary, but rather violent shock.	.....	Persons felt themselves lifted up, and saw the pavement move. There was a very little wind from the east.	Annual Register, vol. xiv. p. 100.
— 5 $\frac{1}{2}$ P.M.	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
June ...	Velletri and the environs	Rather energetic shocks.			Gazette de France et Journ. Encycl. 15 Juillet.
July ... of the thor be- ing of wt.	Scilly Isles	A violent shock			Gazette de France, 23 Août; Journ. Encycl. 15 Août.
— 28. 94 A.M. 2 noon.	Irkutsk, and at Ver- chanskoi (9 wersts from Irkutsk), in the villages above Irkutsk, in the Ostrog of Bal- gunkoi (distant 184 wersts), at Selenginsk, and Kinkta (91 wersts from Selenginsk).	Two shocks, the first of which was feeble, and the second very violent, although scarcely felt in some localities. At Selin- ginsk a similar order was observed. At the other places the motion was slight. The shocks were from N. to S (ac- cording to Pallas, the opposite), lasted 10 sec., and were more violent to the south of Irkutsk. A slight shock.	The Angora exhibited a species of flux and reflux.	The weather was very calm, and the wind westerly, in which direction it remained until the 30th.	Pallas, <i>loc. cit.</i> t. iv. p. 394; Gazette de France, 9 Déc. 1771 et 9 Mars 1772.
Aug. 6. Leghorn				x. Hloß, quoting Cotia, gives the date 7th August.	Gazette de France, 6 Sept.; Cotia, <i>loc. cit.</i>
— 7. (S.)	The Ostrog of Tounki- sk situated in Siberia.	A violent shock. This year is stated to have been most re- markable for the violence of the earthquakes in Cen- tral Asia.		Chinnaya were thrown down. It is very remark- able that the previous shocks were not felt in this district. Pallas concludes that the centre of disturbance of the Altaï chain is situated in the mountains of Zaissan-Noor. See general observations on this district in Pallas, <i>loc. cit.</i> Gmelin in Prévost, <i>Hist. Gén. des Voyages</i> , t. xviii. pp. 214 and 401, and t. xix. p. 340; Humboldt's <i>Asie Centrale</i> , t. ii. p. 110; and Erman, <i>Reise</i> , Th. II. s. 179-184.	Pallas, <i>loc. cit.</i> t. iv. p. 394; Gazette de France, 9 Déc. 1771, 9 Mars 1772.
— 8. Smyrna		A violent shock			Journ. Encycl. 15 Oct.
— 11. At	Memmingen, Dur- lach, Stuttgart, Schaff- hausen	Violent shocks		Services was interrupted in the church; the organ fell to the floor.	Gazette de France, 9 et 11 Oct.

hausen, in the environs of Augsburg, over a space of 60 leagues long and 40 wide, to the banks of the Rhine.	Violent shocks	Followed by a storm	Ditto, 23 Sept. et 11 Oct.; Journ. Encycl. 1 Oct.; Merc. de Fr. Oct.
1771. Aug. 13. At Castiglione, and in the territories of Mantua, Ferrara, and Modena.			
15. In the valley of Magna near Bergamo; and at the same moment the mountain of Brianza.	A very energetic shock	A mountain was thrown down and the debris covered several villages (!). A great quantity of water came from a cleft in the ground.	Ditto.
17. Cagliari, and at the islands of St. Pierre, Tenedos, and Neutri.	Several shocks during 40 seconds.	Accompanied by a subterranean noise	Journ. Encycl. 15 Sept.
24. Astbury in Cheshire	Lasted about 3 secs.		Gentleman's Magazine, vol. xl. p. 422; Gazette de France, 23 Sept.; Merc. de Fr. Oct.
Island of St. Eustache in the West Indies.	A violent shock	Followed by a terrible storm	Gazette de France, 19 Oct.
Sept. 3. Jamaica	A violent shock, lasting 30 seconds.	Did much damage	Ditto, 18 Déc. 1771; Journ. Encycl. 1 Janv. 1772.
Oct. 3. At sea 0° 42' S. lat., and 22° 47' W. long.	A trembling kind of shock.	Felt on board the frigate "le Pacifique," Capt. Bonfils, from the Gold Coast for St. Domingo.	Daussy's Memoir, loc. cit.
Barcelona in Spain	Violent shocks from E. to W. for 5 or 6 seconds.		Gazette de France, 8 Nov.
3 St. Domingo	Fresh violent shocks.	A recently erected church was thrown down. Keferstein mentions this event without giving the month.	Ditto, 27 Déc.; Journ. Encycl. 1 Janv. 1772.
Nov. 7. Barcelona	Violent shocks again for 5 or 6 seconds.		Gazette de France, 16 Déc.
7 ^h 15 ^m P.M.	A shock from E. to W.		Ditto, 24 Janv. 1772.
27. Nice, Sospello, Monaco, and Menton in Italy.			Keilhan's Memoir, loc. cit.
1 ^h 30 ^m A.M.	Several little shocks, for the most part from S.E. to N.W.	Followed by a warm south wind. Generally accompanied by a very temporary fall of the barometer to the extent of two to four millimètres.	
At night.			

1.	2.	3.	4.	5.	6.
1771	Island of Java.....	Several shocks .....	.....	The surface of the ground was upheaved in several places.	Raffles, History of Java, vol. ii. p. 234, and Appendix, p. 7.
1772. Jan. 2. Between 6 and 7 A.M.	Parthenay (department Deux-Sèvres) in France.	A violent shock .....	.....	Furniture was thrown down	Gazette de France, 24 Janv.
— 9. 7 A.M.	Ditto	Ditto, followed by a very slight one at 9 A.M.	.....	Buildings were thrown down. Accompanied by a noise like that of carriages.	Ditto.
— 10. 7 and 9 A.M.	Poitiers	Two rather violent shocks.	.....	.....	Ditto.
— Feb. 18. 7 P.M.	In the neighbourhood of Kola, Russian Lap-land.	An earthquake lasting about a minute, in the direction N. to S.	.....	Preceded by a noise like that of a carriage upon pavement. The houses were shaken, and tiles fell from the roofs. The weather was cloudy and stormy all day. During the disturbance a quantity of snow fell, accompanied by a high wind.	Journ. Encycl. 1 Mai.
— Mar. 8. About noon.	Brétignolles near Chinon (depart. Indreet Loire) in France.	Two shocks, in a ver- tical direction.	.....	Accompanied by a low noise like a prolonged explosion.	Mém. de l'Acad. de Paris, 1772, p. 15; Coll. Acad. t. xv. p. 23.
— 10. 3 o'clock (Italian time).	Padua	One shock .....	.....	.....	Toaldo, <i>loc. cit.</i>
— April 5. Midnight.	Lisbon	Two violent shocks, of which the second and more violent lasted two minutes. The vibration ap- peared to be hori- zontal, from S. to N. This shock was also felt at 12 ^h 6 ^m at Ca- diz, S ^{ta} Maria, San- Lucar-de-Barameda, &c.	.....	The weather was calm and serene, and the sky clear. Before the shocks the dogs howled and cocks crew in a melancholy manner. Then there were heard subterranean noises, with whistling sounds as if in a storm. These noises lasted as long as the shocks. Very little damage was done. Pendulums were stopped by the motion.	Annual Register, vol. xv. p. 89; Ga- zette de France, 4 et 8 Mai; Journ. Encycl. 1 et 15 Mai; Journ. Hist. Juin, p. 473.
— 8. Between mid- night and 1 A.M. (of the 8th or 9th?).	Ditto	A less violent shock, but lasting a long time. From S. to N. as before.	.....	.....	Gazette de France, &c. <i>loc. cit.</i>

Apr. 10. Lisbon	Another, more violent, but not so quick; also from S. to N. From the 6th to the 22nd shocks were felt daily in Algiers.			(Gazette de France, &c. loc. cit.)
— 18. Algiers, 4½, and minutes 5 P.M.	Three heavy shocks at the hours mentioned.			Gazette de France, 1 Juin.
— 19. Josselin in Bretagne	A shock from N.E. to S.W., lasting 3 sec.			Ditto, 25 Mai.
— 20. Genoa	A shock of but short duration.			Ditto, 18 Mai.
— 30. Constantinople	Two shocks; the first slight, the second more violent.			Journ. Encycl. 15 Juin.
June 8. Clausuyes (department Drôme) in Dauphny. 10 P.M.	A slight trembling, followed, at 5 P.M., by three very distinct shocks.			Faujas de Saint-Fond, Hist. Nat. du Dauphiné, t. I. p. 320; Rozier, Obs. sur la Phys.
— 9. Ditto. Felt also in the neighbourhood.	Several shocks.			Ditto.
— 11. Ditto	Fresh and violent shocks. Slight ones were felt at intervals throughout June, the direction of which was then W. to E.			Ditto.
— 16. Padua	A shock			Toaldo, loc. cit.
— 19 th (Ita- time).	A rather violent shock, lasting 2 sec., followed by others of violence at 11 A.M., lasting 1 second.			Gazette de France, 6 et 24 Juillet; Journ. Encycl. 1 Juillet.
— 24. Puy (France) and the country round.				

1.	2.	3.	4.	5.	6.
1772. July 31. 2h 41 ^m P.M.	La Rochelle in France...	A slight shock from S. to N. It was believed that another shock had been felt at 11½ A.M.		Accompanied by a noise resembling that of a carriage rolling rapidly.	Gazette de France, 24 Août; Merc. de Fr. Sept.
— Sept. 13.	In the Tyrol	An earthquake		The earthquake brought down immense masses of ice from the mountains, which so choked up the rivers as to produce the most terrible inundations, many towns and villages being nearly submerged, and a mountain in one place being completely undercut by the water.	Journ. Hist. Déc. p. 467.
— Oct. 31. 23rd hour (or 1st Nov. at 11 A.M.	Padua	One shock			Toaldo, <i>loc. cit.</i>
— — —	In the mountains of Béarn (Pyrenees).	An earthquake.		The village of Arudi was especially injured	Palassou, Mémoires, &c. p. 266.
— Nov. 1. to 29.	Claussayes in Dauphiny	Slight tremblings from time to time during this period.		Accompanied by subterranean noise.	Faujas de Saint-Fond, <i>loc. cit.</i> p. 321.
— — — 29.	Ditto	A brief, sharp shock. Followed by slight ones at intervals up to the 6th Jan. 1773.		The attendant noise was heard almost daily up to the 6th January.	Ditto.
— Dec. 23. 6h 37 ^m P.M.	Havre and the neighbourhood.	A considerable shock		Accompanied by subterranean noise	Gazette de France, 1 Janv. 1773.
— — — 25. 11½ P.M.	Prades (Roussillon) in France.	A shock of two secs. duration.		Accompanied by a low noise, apparently coming from the west.	Gazette de France, 18 Janv.; Merc. de Fr. Fév. 1773.
— — —	In the Beschtau mountains in the Caucasus.	An earthquake.		A portion of Mount Metschukh was severed from the rest, and fell into a chasm in the earth. On the 12th August of this year there was a great eruption of the volcano Tegal in Java and (in this year also) eruptions occurred from Hecla, and the volcano Awatschinskaja in Kamschatka.	Pallas, Reise in die südl. Statzen hal-terschaften des Russ. Reiches. Th. 1. s. 347; Huot. Géol. t. i. p. 112.
1773. Beginning of the year.	At old Fez in Morocco.	A considerable earthquake.		Many houses were thrown down. This event is possibly only the same with that of the 12th April (see below), though it seems hardly usual to call April the beginning of the year.	Gazette de France, 3 Mai.

1773. Jan. 12. 4 A.M. (Ac- cording to the Annual Regi- ster, night of 12-13; hence this should be 4 A.M. of the 13th.)	Comorn in Hungary ... Several violent shocks, in a direction be- tween N. and E.	The Danube rose to a great height, inun- dating the town, and drowning many of the inhabitants.	Accompanied by a low noise. The Gazette de France observes that no year had passed since 1763 without a shock being felt in this district.	Annual Register, vol. xvi. p. 75; Gazette de France, 8 Fév.
— 16. 4½ P.M.	Claussayes in Dauphiny	Two violent shakes. The earth was often agitated during the following night.	.....	Faujas de Saint-Fond, <i>loc. cit.</i> p. 321; Gazette de France, 12 et 22 Fév.; Journ. Encycl. 1 Avril; Merc. de Fr. Mars.
— 18. About 7 A.M.	Ditto	A violent shock, fol- lowed, in an hour and a half, by four others of great vio- lence. Other slight ones were felt du- ring the day, and a very great one at 8¼ P.M.	The second set of shocks detached many stones from the walls. They were accompanied by a fresh, brisk breeze, <i>which only lasted as long as the noise and shocks</i> . These and all the other disturbances were attended with subter- ranean noise.	Ditto.
— 19, 20, 21 and 22.	Ditto	Many feeble shocks...	Accompanied by noise	Ditto.
— 23. 4 P.M.	Ditto. Also at Suze, Valréas, La Garde, Pierrelatte, Monteli- mar, &c., and even be- yond the Rhone, in the direction of St. Andéol and Viviers.	The three most vio- lent shocks hitherto felt.	Great damage was done. At Tulette (3 leagues from Claussayes) some saucers suspended by very long threads oscillated in a remark- able manner, as if attracted and repelled by each other, the motion ceasing suddenly and at once like that of the earth, but after the latter in point of time.	Ditto.
— 24, 26, 27, 28 and 29.	Claussayes	Many slight trem- blings.	Accompanied by noise	Ditto.
— ... Night between 27 and 28.	Semlin and Belgrade	Three shocks in the space of one minute.	The walls were cracked in a terrible manner	Gazette de France, 8 Mars; Journ. Encycl. Avril.
— 28.	St. Savin (Poitou) in France.	Several shocks	Followed by a storm of such violence that houses were thrown down and trees torn up by the roots over a space of more than three leagues.	Gazette de France, 19 Fév.

1.	2.	3.	4.	5.	6.
1773. Jan. ... Night between 30 and 31.	Claussayes again.	Several shocks; one of them terrible.	.....	The noise, ON THIS OCCASION, occurred at the same time with the agitation of the earth.	Faujas de Saint-Fond, &c. <i>loc. cit.</i>
— 31. 11 A.M.	Ditto	Another shock, less considerable	.....	.....	Ditto.
— Feb. 1, 2 and 3.	Ditto	Several moderate shocks.	.....	Three of the shocks were much more perceptible in the farms lying N. to W.	Ditto.
— 4½ A.M.	2. Saint-Jean-Pied-de-Port in Navarre.	Two shocks, lasting more than two min.	.....	.....	Gazette de France, <i>loc. cit.</i>
— 2 P.M.	4. Claussayes	A violent agitation ...	.....	.....	Faujas de Saint-Fond, &c. <i>loc. cit.</i>
— 1½ A.M.	7. Ditto	Another shock, nearly as violent as that of the 23rd Jan., but lasting at most only 4 secs. The direc- tion of the shocks from their com- mencement to this day was uniformly E. to W. They were sharp, unequal, ho- rizontal oscillations. Slight shocks con- tinued up to the 15th.	.....	Felt strongly at the farms spoken of above, though but slightly at the village. The point from which these shocks seemed to come was a little hill, known as the "Sault de la pierre," about seventy toises in height, and situated not more than a thousand yards from the village. A trembling like that produced by carriages on pavement was felt, and at the occurrence of all the considerable shocks a "tourbillon" of wind was remarked, which stopped the progress of both men and animals, terrifying the latter.	Ditto.
— 15. 11½ A.M.	Ditto	A very short, but vio- lent shock, followed by slight ones up to the 22nd.	.....	The motion became feebler at Claussayes, but increased to the S.W. The noise alone was often heard at the former place, while the agi- tation of the ground was quite sensible at Saint-Raphaël, a village at the distance of a league.	Ditto.
— 22. Between 8 and 9 A.M.	Ditto	Three violent shocks..	.....	Accompanied by a surprisingly loud noise	Ditto.
— 24. Same hour.	Ditto	Ditto .....	.....	Walls were thrown down	Ditto.
— 25.	Ditto, and Saint-Raphaël	Slight disturbance at Claussayes, the	.....	.....	Ditto.

Mar. 24. In the Soudan, Nor- way.	shocks becoming, however, violent at Saint-Raphaël. From this until the 1st June the former was generally at rest, and only suffered slight shocks at intervals, while at the latter the disturbance became very violent, and extended to a part of the territory of Claussyes hitherto spared.				Keilhan, <i>loc. cit.</i>
April 1. Ragusa.....	A considerable shock, followed by a succession, of less violence, at 10 p.m.	Accompanied by a subterranean noise			Gazette de France, 18 Juin; Journ. Hist. Août, p. 147.
— 12. Cadiz, Rota, S ^{ra} Maria, Port Royal, at the Clancie, Lisbon, &c. Also at Madrid, Malaga and Gibraltar, and at Salee and Tangiers on the coast of Africa.	At Cadiz the shocks were violent from E. to W. for two minutes. At Lisbon several shocks were felt, lasting five or six seconds, the last one being the most violent, and the direction E. to N.W. At Malaga they lasted one minute. At Salee but one shock was remarked. It was from E.S.E. to W.N.W., lasting 46 seconds. At Tangiers the direction was E. to W.	The sea at Cadiz remained quite calm.	The pendulum of the observatory at Cadiz were stopped, which gave the exact time of the phenomenon. At Lisbon the air was calm, and no subterranean noise was heard. Towers were almost completely ruined. Numbers of houses were thrown down and people injured. The Annual Register mentions two shocks at Madrid and Cadiz on the 13th at 5 a.m., but it seems pretty certain that it must refer to the morning of the 12th.		Gazette de France, 7 Mai, 2 et 16 Juillet; Journ. Hist. Juin, p. 474-5; Journ. Encycl. Juin et Août; Annual Register, vol. xvi. p. 100-101.

1.	2.	3.	4.	5.	6
1773. Apr. 15. Between noon and 1 P.M.	St. Malo. Also in Guernsey and Jersey. Also felt on the coast of Dorsetshire.	At St. Malo a shock of a minute's duration from N.W. to S.E. In Guernsey one was felt at 1¼ P.M., one in Guernsey and Jersey at 2¼ P.M., and another in Guernsey at 4 A.M. the following morning.		Accompanied by a noise like a cart rolling over a stone pavement. At Poole in Dorsetshire things were thrown off the shelves by the shock. Pendulums were stopped at St. Malo.	Annual Register, vol. xvi. p. 95; Gazette de France, 30 Avril, 7, 10, 17, 21 et 31 Mai.
— 2 P.M.	— Pléneuf in the diocese of St. Brieuc. Also felt at Dol.	One shock, in the direction N.W. to S.E.		Accompanied by a noise like prolonged thunder.	Gazette de France, <i>loc. cit.</i>
— and 18.	— On the south-west coast of Spain.	Several shocks			Annual Register, vol. xvi. p. 101.
— 11¼ P.M.	23. Pléneuf again. Also all the country of Cotentin, at Dol, and in the island of Jersey.	Another shock in the same direction.		Ditto. Both shocks were felt most severely in the low lands.	Gazette de France, <i>loc. cit.</i>
— 8 ^h 30 ^m A.M.	30. Cornon in Hungary	A shock of more violence than that of the 28th June 1763. It was in the direction S. to N.E., and lasting ten seconds. Several shocks of considerable violence.		No damage done, notwithstanding the severity of the shock. A noise like thunder was heard at the time. The weather was calm and serene, but some days before heavy wind and rain had been experienced.	Ditto, 24 Mai; Journ. Encycl. Juin.
—	— Frascati in Italy	Several shocks of considerable violence.			Gazette de France, 17 Mai.
— May 6. 10 A.M.	6. Algiers, Tangiers, and the north coast of Africa.	About twenty shocks. The tremulous motion between the shocks lasted from six to seven seconds to half a minute.	At Algiers the sea rose 5 feet 10 inches in every fourteen minutes, and then fell so low as to leave the boats aground. This decreased from noon until four the next morning. At Tangiers the sea rose 30 feet perpendicularly.	The earthquake consisted of a succession of tremblings and violent shocks. At Tangiers the fountains stopped, and at last there gushed out a black water having a bituminous taste.	Annual Register, vol. xvi. p. 105.

6 A.M. (Nearly at the same time with the last).	Corfu	An earthquake .....	.....	The third part of the island was ruined	Hist. Août, p. 147. Gazette de France, 2 Juillet, quoting "la Rubrique d'Italie" of the 25th May; Merc. de Fr. Juillet.
June 1. 2½ P.M.	Clanssayes again	A terrible shock, nothing more being felt during this month.	.....	Unaccompanied by noise, though from 4 A.M. to midday a subterranean noise was heard, and again on the following day, when no shock was felt.	Faujas de Saint-Fond, <i>loc. cit.</i> p. 327.
— — — 3.	Guatemala	The earthquake lasted five days.	.....	Two neighbouring volcanoes gave signs of action. From the one torrents of hot water, and from the other lava flowed. The earth opened, and the disturbance was accompanied by thunder, lightning, and rain. On the 7th the earth opened in huge chasms, and swallowed up the city of St. Jago with 5000 (or 8000) families.	Berghaus, Allgemeine Lander und Volker-Kunde; Th. 6. S. 448; Borowski, Abriss einer Naturgeschichte des Elementarreichs, pl. 82; Gazette de France, 27 Juin, 1774; Journ. Encycl. Fév. 1774; Annual Register, vol. xvi. p. 149; Vivenzio, <i>loc. cit.</i> p. 22. Faujas de Saint-Fond, <i>loc. cit.</i>
July 7. In the morning.	In the western part of the territory of Clanssayes.	Three more very severe shocks. From this day until the 13th October very little disturbance was felt at Clanssayes, but very heavy shocks occurred from time to time at Saint Raphaël. Violent shocks recurred.	.....	Scarcely felt in the village	
— — — 29, of 31. 4 P.M.	Guatemala again .....	.....	.....	Still later (the exact date not given) another earthquake completed the damage done before, and the city was afterwards rebuilt (for the third time) four leagues to the west of its former site. From Huot (<i>Géologie</i> , t. i. p. 112) giving the 29th June as the date of 45,000 people perishing by an earthquake in America, without specifying the place, it is possible that this event occurred at Guatemala at the end of June, not July.	Berghaus, &c., as above, <i>loc. cit.</i>
Aug. 4½ P.M.	8. Luxemburg; extending as far as Vienna, though but slight at the latter place.	A severe shock .....	.....	.....	Gazette de France, 27 Août.

1.	2.	3.	4.	5.	6.
1773 A.M. 15 St. Malo. Also in Guernsey and Jersey. Also a minute's duration felt on the coast of Dorsetshire.	At St. Malo a shock of six and a half minutes' duration from N.W. to S.E. In Guernsey one was felt at 1 1/4 P.M., one in Jersey and Jersey at 2 1/4 P.M., and another in Guernsey at 4 A.M. the following morning.	At St. Malo a shock of six and a half minutes' duration from N.W. to S.E. In Guernsey one was felt at 1 1/4 P.M., one in Jersey and Jersey at 2 1/4 P.M., and another in Guernsey at 4 A.M. the following morning.	Accompanied by a noise like a cart rolling over a stone pavement. At Poole in Dorsetshire things were thrown off the shelves by the shock. Pendulums were stopped at St. Malo.	Accompanied by a noise like prolonged thunder. <i>Gazette de France, loc. cit.</i>	Annual Register, vol. xvi. p. 95; Gazette de France, 30 April, 7, 10, 17, 21 et 31 Mai.
2 P.M.	Plumed in the lozese of One shock, in the direction N.W. to S.E.	Plumed in the lozese of One shock, in the direction N.W. to S.E.	Accompanied by a noise like prolonged thunder. <i>Gazette de France, loc. cit.</i>	Accompanied by a noise like prolonged thunder. <i>Gazette de France, loc. cit.</i>	Annual Register, vol. xvi. p. 101.
and 18.	On the south-west coast Several shocks	On the south-west coast Several shocks	Accompanied by a noise like prolonged thunder. <i>Gazette de France, loc. cit.</i>	Accompanied by a noise like prolonged thunder. <i>Gazette de France, loc. cit.</i>	Annual Register, vol. xvi. p. 101.
11 1/4 P.M.	23. Péned'agun Also all Another shock in the same direction.	23. Péned'agun Also all Another shock in the same direction.	Accompanied by a noise like prolonged thunder. <i>Gazette de France, loc. cit.</i>	Accompanied by a noise like prolonged thunder. <i>Gazette de France, loc. cit.</i>	Annual Register, vol. xvi. p. 101.
30. Cornou in Hungary	A shock of more violence than that of the 24th June 1763. It was in the direction S to N.E., and lasting ten seconds.	A shock of more violence than that of the 24th June 1763. It was in the direction S to N.E., and lasting ten seconds.	Accompanied by a noise like prolonged thunder. <i>Gazette de France, loc. cit.</i>	Accompanied by a noise like prolonged thunder. <i>Gazette de France, loc. cit.</i>	Annual Register, vol. xvi. p. 101.
30. Cornou in Hungary	Several shocks of considerable violence. About twenty shocks. The tremulous motion between the shocks lasted from six to seven seconds to half a minute.	Several shocks of considerable violence. About twenty shocks. The tremulous motion between the shocks lasted from six to seven seconds to half a minute.	Accompanied by a noise like prolonged thunder. <i>Gazette de France, loc. cit.</i>	Accompanied by a noise like prolonged thunder. <i>Gazette de France, loc. cit.</i>	Annual Register, vol. xvi. p. 101.
Present in Italy	At Algiers the sea rose 5 feet 10 inches in every fourteen minutes, and then fell so low as to leave the boats aground. This decreased from noon until four the next morning. At Tangier the sea rose 30 feet perpendicularly.	At Algiers the sea rose 5 feet 10 inches in every fourteen minutes, and then fell so low as to leave the boats aground. This decreased from noon until four the next morning. At Tangier the sea rose 30 feet perpendicularly.	Accompanied by a noise like prolonged thunder. <i>Gazette de France, loc. cit.</i>	Accompanied by a noise like prolonged thunder. <i>Gazette de France, loc. cit.</i>	Annual Register, vol. xvi. p. 103.

1.	2.	3.	4.	5.	6.
1773. Sep. 13. Be- ginning of the Month. (Day not given.) About 10 P.M.	In the valley of Ossau in the Pyrenees.	One shock .....	.....	Felt very slightly at the Castle of Espalangué, while at the houses of the warm baths, built upon granite, the shock was very severe.	Palassou (who was actually at the Castle of Espalangué at the time), <i>loc. cit.</i>
— 13. Bergen, Winger, and throughout a great part of Norway.		A trembling move- ment.	.....	At Winger two terrible storms and the earth- quake were experienced on the same day. The whole was accompanied by subterranean and whistling noises, and the fall of a torrent of rain.	Gazette de France, 26 Nov.; Viven- zio (1783), p. 46.
— 24. Lisbon		A violent shock .....	.....	.....	Gazette de France, 5 Nov.
8 ^h 30 ^m P.M. — Oct. 13. Claussayes again		Three violent shocks. The motion was ver- tical, and followed the direction S. to N. Three slight shocks...	.....	One of the shocks was followed by a consider- able noise.	Faujas de Saint-Fond, <i>loc. cit.</i> p. 328.
— 15. Ditto .....		.....	.....	.....	Ditto.
4 P.M. — 17. Pau, Gant, and Arudi, in the Pyrenees. 10 ^h 1 ⁴ A.M. — 18. Ditto		Two shocks from S. to N.E. Another shock.....	.....	.....	Gazette de France, 5 Nov.; Journ. Encycl. Janv. 1774. Ditto.
5 ^h 1 ⁴ A.M. — 19. Ditto		Ditto .....	.....	.....	Ditto.
5 A.M. — 22. Ditto		Ditto .....	.....	.....	Ditto.
6 A.M. — Nov. 25. Claussayes again.....		Some slight shocks, followed by others, gradually decrea- sing until the end of December, when they had altogether ceased. At St. Ra- phaël, however, the shocks continued violently all this month, after which calm reigned there	.....	Accompanied by noise. These villages were almost completely ruined by the long series of shocks to which they were exposed, especially Claussayes, it being situated on the top of a mountain, the base of which consisted of a loose mixture of sand and clay.	Faujas de Saint-Fond, <i>loc. cit.</i>

Copiapó in Chili	An earthquake .....	.....	.....	According to Kefenstein this earthquake occurred on the 29th July, the day of the second set of shocks at Guatemala.	Basil Hall, Journal written on the coast of Chili, vol. ii. p. 25; Kefenstein.
Jan. 15. Vienna, Neustadt, Presburg, and many places in Hungary.	Three (according to the Annual Register, two) shocks, lasting thirty-five to forty seconds. Direction = N.W. to S.W.	.....	.....	The weather was quite calm	Gazette de France, 4 et 21 Fév.; Merc. de Fr. Mars; Annual Register, vol. xvii. p. 92.
— 26 and 28 Feb.	.....	.....	.....	The tower of a church was thrown down	Gazette de France, 11 Mars.
Feb. 7. Martinique	One shock .....	.....	.....	.....	Ditto, 10 Juin.
— 23 and 24 Feb.	A slight trembling .....	.....	.....	.....	Ditto, 25 Mars; Vivensio (1783), p. 47.
Mar. 4. Ditto	More shocks of considerable violence, in the direction S. to N., and lasting one minute. Several more were felt during the night.	.....	.....	Preceded by a loud subterranean noise. Chimneys and walls were thrown down.	Chim-Gazette de France, loc. cit.
— 31. Padua	A single shock .....	.....	.....	.....	Tosaldo, loc. cit.
Apr. 12. Ditto	Another shock .....	.....	.....	.....	Ditto.
— 17. Berne	Rather a violent shock .....	.....	.....	.....	Annual Register, vol. xvii. p. 122.
Before Cayenne	Violent shocks .....	.....	.....	.....	Gazette de France, 26 Août, quoting a letter from London, dated Aug. 6.
Apr. 10. Altdorf and St. Gallen in Switzerland.	At Altdorf and St. Gallen there were shocks at 3, 9, and 11 A.M., 4 P.M., and .....	.....	.....	The steeple of the church at Altdorf was split through, and many houses were thrown down. Great masses of rock were shaken from the surrounding hills. The earth continued in	Annual Register, vol. xvii. p. 186; Gazette de France, 18 Nov.; De Saussure, Voyages dans les Alpes, t. iv. p. 112.

1.	2.	3.	4.	5.	6.
Sep. 11. In the valley of Ossau One shock of the in the Pyrenees. h. (Day, even) at 10 P.M.				Felt very slightly at the Castle of Espalange-Palason (who was actually at the Castle of Espalange at the time), <i>loc. cit.</i>	
— 13. Bergen, Winger, and A trembling move- ment. throughout a great part of Norway.				At Winger two terrible storms and the earth- quake were experienced on the same day. The whole was accompanied by subterranean and whistling noises, and the fall of a torrent of rain.	Gazette de France, 26 Nov.; Viven- zio (1763), p. 46.
— 21. Lisbon 10 th P.M.		A violent shock			Gazette de France, 5 Nov.
Oct. 13. Claussayes again M.		Three violent shocks. The motion was ver- tical, and followed the direction S. to N.		One of the shocks was followed by a consider- able noise.	Feuilles de Saint-Fond, <i>loc. cit.</i> p. 328.
— 15. Ditto M.		Three slight shocks.			Ditto.
— 17. Pau, Gant, and Arudi, in the Pyrenees. A.M.		Two shocks from S. to N.E.			Gazette de France, 5 Nov.; Journ. Encycl. Janv. 1774.
— 18. Ditto A.M.		Another shock.			Ditto.
— 19. Ditto M.		Ditto			Ditto.
— 22. Ditto M.		Ditto			Ditto.
Nov. 25. Claussayes again.....		Some slight shocks, followed by others, gradually decreas- ing until the end of December, when they had altogether ceased. At St. Ra- phael, however, the shocks continued violently all this month, after which calm reigned there also.		Accompanied by noise. These villages were almost completely ruined by the long series of shocks to which they were exposed, especially Claussayes, it being situated on the top of a mountain, the base of which consisted of a loose mixture of sand and clay.	Feuilles de Saint-Fond, <i>loc. cit.</i>

1½ A.M.	neighbouring villages. Copiapo in Chili	from N. to S. An earthquake .....	.....	According to Keferstein this earthquake occurred on the 29th July, the day of the second set of shocks at Guatemala. The weather was quite calm	Basil Hall, Journal written on the coast of Chili, vol. ii. p. 25; Keferstein.
1774. Jan. 15. 1½ P.M.	Vienna, Neustadt, Presburg, and many places in Hungary.	Three (according to the Annual Register, two) shocks, lasting thirty-five to forty seconds. Direction = N.W. to S.W.	.....	.....	Gazette de France, 4 et 21 Fév.; Merc. de Fr. Mars; Annual Register, vol. xvii. p. 92.
— Night between 26 and 27.	Ratibor in Silesia	An earthquake .....	.....	The tower of a church was thrown down	Gazette de France, 11 Mars.
— Feb. 7. 6½ 30 ^m P.M.	Martinique	One shock .....	.....	.....	Ditto, 10 Juin.
— Night between 22 and 23.	Parma	A slight trembling .....	.....	.....	Ditto, 25 Mars; Vivenzio (1783), p. 47.
— Mar. 4. 19th hour.	Ditto	More shocks of considerable violence, in the direction S. to N., and lasting one minute. Several more were felt during the night. A single shock .....	.....	Preceded by a loud subterranean noise. Chimneys and walls were thrown down.	Gazette de France, loc. cit.
— 31. 23rd hour.	Padua	A single shock .....	.....	.....	Toaldo, loc. cit.
— April 12. 2½ 5 ^m (Italian time).	Ditto	Another shock .....	.....	.....	Ditto.
— 17. Midnight.	Berne	Rather a violent shock.	.....	.....	Annual Register, vol. xvii. p. 122.
— Before the 6th Aug.	Cayenne	Violent shocks .....	.....	.....	Gazette de France, 26 Août, quoting a letter from London, dated Aug. 6.
— the 10th Sept.	Altdorf and Stenzen in Switzerland.	At Altdorf and Stenzen there were shocks at 3, 9, and 11 A.M., 4 P.M., and	.....	The steeple of the church at Altdorf was split through, and many houses were thrown down. Great masses of rock were shaken from the surrounding hills. The earth continued in	Annual Register, vol. xvii. p. 166; Gazette de France, 18 Nov.; De Saussure, Voyages dans les Alpes, t. iv. p. 112.

1.	2.	3.	4.	5.	6.
		the next day at mid- night and 3 a.m.; altogether six vio- lent shocks, and other slighter ones.		agitation for some time.	
Sept. 10. Strasbourg, Belfort, Be- saucon, Beaune (or Beaune-les-Dames?), and Bâle. Also slight- ly at Reims and Anspach. 5 p.m.	Several shocks from W. to E. At Bel- fort three occurred in the space of 4 mins. At Beaune a violent shock last- ing about half a minute.	On the 24th of this month the sea ebbed and flowed three times in an hour to the extent of 2 feet in perpendicular height, both at Ma- laga and Leghorn. No earthquake shock mentioned.	As some of these places the shocks produced much alarm, but no damage seems to have taken place.	Gazette de France, 23 (or 27) Sept., 7 Oct.; d'Annoué's Meteorolo- gical Register.	
— 15. Padua	Another shock				Toaldo, <i>loc. cit.</i> ; Annual Register, vol. xvii. p. 160.
Oct. 22. Comorn in Hungary ..	One shock				Gazette de France, 16 Déc. Toaldo, <i>loc. cit.</i>
— 27. Padua	Another shock				
— 29. In the prefecture of Har- dager, and at Bergen in Norway.	Several shocks			Many houses were shaken by the motion	Gazette de France, 20 Fév. 1775.
Nov. 29. Kongberg and Eger- sand in Norway.	A shock of 1½ minute duration.			Buildings were shaken	Ditto, 30 Déc.
Jan. 4. Parma	Several shocks				Gazette de France, 27 Janv.; Journ. Encycl. Pér.
— 5 p.m. Padua	Ditto				Toaldo, <i>loc. cit.</i>
— 5. Genoa	One shock, followed by another at 7½ p.m.				Gazette de France, and Journ. En- cycl. <i>loc. cit.</i> ; Costa, <i>Tablées</i>
11 a.m.					

1775. Jan. 6. Modena	Two shocks, from S. to N. ....	.....	Gazette de France, and Journ. Encycl. <i>loc. cit.</i>
— 24. Breslau	A slight trembling .....	.....	(Econimische Nachrichten der Gesellschaft in Schlesien, B. 3. S. 25; Journ. Encycl. Mars.
—, or Skara in West Gothland, Sweden. Feb. (day not given) 6½ P.M.	One shock .....	.....
— Feb. 4. Rethel in Champagne...	A trembling .....	.....	Cotte, Tabl. Chron. <i>loc. cit.</i>
— Night between 6 and 7. St. Savin and several villages near Bourgoing (department Isère), France.	A violent shock .....	.....	Gazette de France, 10 Mars.
— 14. Turin	A rather smart shock. ....	.....	Ditto, 24 Fév.; Cotte, <i>loc. cit.</i>
— April. Island of Amboyna.....	A violent shock from S.W. to N.E. The motion lasted altogether five minutes. ....	.....	"An Account of Celebes, Amboyna," &c. in Pinkerton's Voyages and Travels.
— 30. Villar in the généralité of Auch, and at Nortes in the Pyrenees. 9½ P.M.	Two shocks, followed at the second place by a third at 10½ P.M. All in the direction E. to W. ....	.....	Gazette de France, 22 Mai.
— May 23. Sala in Sweden, and the country round.	The waters of the lakes were violently agitated. Fish rose suddenly to the surface. ....	.....	Berendtsen in Abh. d'Acad. zu Stockholm (German translation), Th. 37, S. 178.
— June. Monte Pulciano in Tuscan. Night of 20, 21	A violent shock .....	.....	Gazette de France, 31 Juillet; Cotte, <i>loc. cit.</i>
— Fayal in the Azores.....	Several shocks .....	.....	Cook's Voyage to the Southern Hemisphere.
— 1 July and 2. Guatemala	Another violent earthquake. ....	.....	Gazette de France, 5 Janv. 1776.
	Accompanied by an eruption of the volcano Pacaya. The city was again ruined. v. Hoff (quoting Humboldt in Hertha, B. 6. S. 138), who gives the date 11th July for the eruption of Pacaya, does not mention the earthquake at all, and records (in this year, but without more exact date) an eruption of the volcano	.....

1.	2.	3.	4.	5.	6.
1775. Sept. 5 Island of Ternate (or Oct. 8). About 9 ^h 45 ^m P.M. Oct. 6. Vico in Corsica 7 ^h 35 ^m P.M. 16. Malaga..... 22. Vico in Corsica again... 2 ^h 12 ^m A.M. 30. Tournon in the Vivarais. Dec. 26, Padua 6th hour (Italian time). 30. At Toulouse, and many other places in France, Corbeil, Mortagne, Segré, Alençon, Havre, Caen, St. Lo, Falaise. About 10 ^h A.M. 10 ^h 42 ^m . 10 ^h 34 ^m . 10 ^h 43 ^m . 10 ^h 32 ^m .	An earthquake Tremblings, in the direction E. to W. A shock of considerable violence. A shock of 3 or 4 secs. duration. Four more shocks from S.E. to S.W. A trembling One shock At Toulouse a slight shock from E. to W. At Corbeil a gentle undulatory motion from N.W. to S.E. At Alençon, two shocks, the first the most severe, and lasting half a minute. At Mortagne 3 shocks in a vertical direction, each more violent than the preceding. At Havre a slight shock from W. to E. lasting five seconds. At Caen three severe shocks, lasting five or six seconds, and	At St. Lo and Falaise vessels at sea felt the shocks, but the waters of the Orne were not agitated. At Alençon the first shock was accompanied by a noise like the rolling of a carriage. A well of 45 feet deep had its waters made turbid and blackish. At Segré (Maine-et-Loire) the streams which ran from S.W. to N.E. appeared to boil, while those running in the opposite direction were not affected. The villages in valleys not overlooked by mountains to the S.E. experienced hardly anything. At Caen the noise preceded the shocks, seemed to come from the S.W., and lasted two or three seconds. Another noise was heard <i>after</i> the shocks. Chimneys and some houses were thrown down. The shock of the 1st January threw down a house at Hérouville.	Granada or Massaya near the lake of Nicaragua. Possibly this account of the earthquake is merely that of two years before. Accompanied by noise Accompanied by a violent gust of wind from the N.W. A noise like the explosion of a mine was heard. One house was thrown down. Accompanied by a heavy gust of wind At Alençon the first shock was accompanied by a noise like the rolling of a carriage. A well of 45 feet deep had its waters made turbid and blackish. At Segré (Maine-et-Loire) the streams which ran from S.W. to N.E. appeared to boil, while those running in the opposite direction were not affected. The villages in valleys not overlooked by mountains to the S.E. experienced hardly anything. At Caen the noise preceded the shocks, seemed to come from the S.W., and lasted two or three seconds. Another noise was heard <i>after</i> the shocks. Chimneys and some houses were thrown down. The shock of the 1st January threw down a house at Hérouville.	Vivenzio (1783), p. 47. Phil. Trans. vol. lx. p. 368, and vol. lxxi. p. 193. Gazette de France, 20 Nov.; Cotte, <i>loc. cit.</i> Gazette de France, 24 Nov.; Cotte, <i>loc. cit.</i> Gazette de France, 20 Nov.; Cotte, <i>loc. cit.</i> Cotte, <i>loc. cit.</i> Toaldo, <i>loc. cit.</i> Gazette de France, 5, 8, 12, 19 et 29 Janv., 9 Fév. et 27 Mars, 1776; Cotte, <i>loc. cit.</i>	

1775.	In Iceland	to N.E. A slight trembling succeeded them. At St. Lo and Falaise they were still more violent. A fourth shock was felt at 11 A.M., and a fifth on the 1st January.	.....	.....	v. Hoff.
1776. Jan. 30.	At Brest, and Landernau in Bretagne.	An earthquake .....	.....	.....	Cotte, <i>loc. cit.</i>
— — —	In the Spanish part of St. Domingo.	An undulatory shock.	.....	.....	Ditto.
— Feb. 2.	Rhode Island, N. America.	An earthquake .....	.....	Accompanied by igneous meteors	Jameson's Journal, vol. xxxi. p. 302.
— — —	7. Irkutsk in Siberia	Ditto .....	.....	.....	Cotte, <i>loc. cit.</i>
— — —	10. The little Danish island of Thorøe near Fünen.	A trembling.....	.....	An earthquake is mentioned by the Gazette de France, at the island of Thorn near Assens, on the 20th. It refers in all probability to this event.	Ditto.
— — — 0 ^h 15 ^m A.M.	27. Malta	A shock which lasted at least a minute. The motion was horizontal, from S. to N.	.....	The dome of the cathedral was split by the shock, as in 1742.	The Gazette de France, 12 Avril; Cotte, <i>loc. cit.</i>
— April 14.	In Poitou, at la Rochelle, and in the island of Oleron.	Several shocks .....	.....	.....	Cotte, <i>loc. cit.</i>
— — — 5 ^h 36 ^m A.M.	21. Acapulco	An earthquake .....	.....	The greater part of the city was ruined	Dupetit-Thonars, <i>loc. cit.</i> t.ii. p.213.
— — — 1 A.M.	22. Fiume and Trieste. Also at Bukkari.	A violent shock; most severe at Bukkari.	.....	At Bukkari the walls of a salt warehouse were split through. On the 28th March Vesuvius, and on the 27th April Etna was in eruption.	Ditto; Gazette de France, 14 Juin.
— — — 1 A.M.	24. Perpignan	Two shocks .....	.....	.....	Gazette de France, 10 Mai; Cotte, <i>loc. cit.</i> ; Palassou, <i>loc. cit.</i>
— — — 30.	In Poitou, at la Rochelle, and in the island of Oleron. On the same day at la Barthe de Neste in the Pyrenees.	More shocks .....	.....	Cotte mentions an earthquake in this region of the Pyrenees on the 30th April 1775. One account or the other is probably erroneous.	Cotte, <i>loc. cit.</i> ; Palassou, <i>loc. cit.</i>
— June 1.	Island of Ternate	An earthquake .....	.....	.....	Cotte, <i>loc. cit.</i>

1.	2.	3.	4.	5.	6.
1776. June 6. Gibraltar 5 A.M.		One shock, lasting about fifty seconds.	Felt on board the ships in the harbour as well as on shore.	.....	Cotte, <i>loc. cit.</i> ; Annual Register.
— July 10. Trieste. Also felt at Al Triestethree shocks 5 ^h 40 ^m or Loubiano (Laybach?), from W. to E. The first 45 ^m P.M. Udine and Venice; lasted half a minute and was rather considerable, the second slight, and the third a little stronger.		One shock	.....	In the Frioul many houses were thrown down. v. Hoff (quoting Cotte) gives the date 10th June.	Gazette de France, 19 Août; Cotte, <i>loc. cit.</i>
— 11. Padua 9 ^h 15 ^m A.M.		One shock	.....	.....	Toaldo, <i>loc. cit.</i>
— Aug. 4. Carcassone (département de l'Aude), France.		A severe shock	.....	Caused great damage	Cotte, <i>loc. cit.</i>
— 20. Cap Français, St. Domingo.		Several shocks	.....	.....	Ditto.
— Sept. 6. Guadaloupe — Oct. 28. Northampton. Less violent at Harborough, Loughborough, &c. in Leicestershire.		An earthquake	.....	Accompanied by a violent hurricane	Ditto.
10 ^h 45 ^m A.M.		A sudden shock, lasting about two secs.	.....	The windows shook during the shock, and a ball or balls of fire were observed in the heavens.	Annual Register, vol. xix. p. 187; Cotte, <i>loc. cit.</i>
— Nov. 27. Canterbury, Sandwich, From S. to N., lasting 8 ^h 15 ^m P.M. Ashford, Dover, and all the coast of Kent. Also at Calais.		At Calais the direction was N. to S.	.....	Attended with a rumbling noise. The day was gloomy and perfectly calm, wind south, barometer at 29.8 in. and thermometer in the shade 37° 3. Some china on a chest of drawers was moved an inch or two. Furniture was also moved, at Dover bells were made to sound, and at Calais loaves were thrown off the shelves in the bakers' shops. v. Hoff, quoting Cotte, gives the date Nov. 24, 8½ A.M.	Annual Register, vol. xix. p. 193; Gazette de France, 9 Déc; Cotte, <i>loc. cit.</i>
— 28. Mannheim 3 ^h 15 ^m A.M.		Two violent shocks, of which one lasted a minute and some seconds, and the other a minute. Direction N.W. to S.E.	.....	The houses were cracked and bells sounded of themselves. At the observatory the shock was supposed to be vertical, as a plumb-line of 10 feet in length was not moved, and a compass needle of 1 foot long deviated but 3'. The air was calm. A shock is mentioned at 8 ^h 10 ^m A.M. of this day at Calais, Dunkirk, and Dover; but it obviously refers to the	Gazette de France, 9 Déc. et 27 Janv. suiv.; v. Hoff; Cotte, <i>loc. cit.</i>

1776. Nov. ...	In S. Carolina, North America.	An earthquake	.....	.....	Jameson's Journal, voi. xxxi. p. 302.
— Dec. 19.	Spies	A trembling	.....	.....	Cotte, <i>loc. cit.</i>
— — 24.	Hernösand in Finland. (Norway?)	Ditto	.....	.....	Ditto.
— — —	Mannheim, Worms, Spies, and the neighbourhood of Mayence.	Direction = N.W. to S.E., lasting fifteen seconds.	.....	This account probably arises merely from confounding those of the 28th Nov. and 19th Dec.; but from the details given it seems worth inspection.	Annual Register, vol. xix. p. 203.
— — —	Inverness	An earthquake felt here during this year.	.....	.....	Thomson's Annals of Philosophy, vol. viii. p. 366.
— — —	From the neighbourhood of Lake Baikal as far as the Altai, Kolyvan.	An earthquake	.....	.....	Humboldt, <i>Asie Centrale</i> , t. ii. p. 112.
1777. Jan. 19.	Leghorn and Tivoli	Ditto	.....	.....	v. Hoff.
— Feb 7. 2 A.M.	Lucerne, in the canton of Unterwalden, and in the environs. Perceived at Aarberg, Anet (Berne), Neuchâtel, and Neufchâtel.	A rather violent shock; the earth appearing to be raised without any oscillations.	.....	At Sarnen some chimneys were thrown down	Journal Helvétique, Avril 1777.
— Mar. 5.	Spezin and along the Genoese coast.	A violent shock	.....	.....	Gazette de France, 31 Mars; Cotte, <i>loc. cit.</i>
— April. Beginning of the month, or even before.	Cremble-Point near Turryburn, Scotland.	An earthquake	.....	Accompanying the sudden sinking of several acres of land beneath which were mines. A noise like thunder was heard at the time. Probably the shock was due solely to the landslip.	Gazette de France, 14 Avril.
— May 18 to 25.	In Hungary	Trembling movements during this time.	.....	.....	Cotte, <i>loc. cit.</i>
— June 6. 4 P.M.	Naples, and, more slightly, at Rome. Also felt in Sicily, La Puglia and Calabria.	Some other shocks had been felt up to the day before.	.....	Many houses were thrown down in La Puglia, Calabria, and Sicily.	Gazette de France, 14 et 25 Juillet, 11 Août; Cotte, <i>loc. cit.</i>
— — — 7. 7 ^h 55 ^m A.M.	Pau (in the Pyrenees) and the surrounding district, as far as the boundaries of Commingues and the Pays de Foix.	A violent shock	.....	The date given is 1772, but v. Hoff says it is obviously intended to be 1777 or even 1778.	Palassou, <i>loc. cit.</i> p. 266.

1.	2.	3.	4.	5.	6
1777. June 7. 8 ^h 15 ^m A.M.	Padua	One shock .....	.....	.....	Toaldo, <i>loc. cit.</i>
— 8. 3 A.M.	Nay in the Pyrenees ...	Two shocks.....	.....	.....	Palassou, <i>loc. cit.</i>
— July 4. 5 ^h 35 ^m P.M.	Malaga.....	2 consecutive shocks, lasting 8 to 10 secs., in the direction N. to S.	.....	.....	Gazette de France, 8 Août; Cotte, <i>loc. cit.</i>
— 6. Messina ...	.....	A single shock.....	.....	.....	Cotte, <i>loc. cit.</i>
— 28. Comorn in Hungary ...	.....	An earthquake .....	.....	.....	v. Hoff.
— Aug. 5. In some parts of Tus-	canv.	Tremblings .....	.....	.....	Cotte, <i>loc. cit.</i>
— 13. Village of Brón in the	A very violent shock.....	.....	.....	.....	Palassou, <i>loc. cit.</i>
About 10 P.M.	valley of Ossau in the Pyrenees.	E.S.E. to W.N.W.	.....	.....	Gazette de France, 19 Sept.; Cotte, <i>loc. cit.</i> ; v. Hoff.
— 19. Sola, Isola, and Veroli	Very smart shocks .....	.....	.....	.....	Gazette de France, 2 Fév. 1778; Cotte.
— Sept. 2. Island of St. Thomas in	Two violent shocks, .....	.....	.....	.....	Phil. Trans. vol. lxviii. p. 221; An- nual Register, vol. xx. p. 78.
1 ^h 30 ^m P.M.	the West Indies.	each lasting a mi- nute. The following day, towards even- ing, three more shocks were felt.	.....	.....
— 14. Manchester. Also, though	Three violent shocks. A boat on a canal near	.....	.....	.....
10 ^h 55 ^m A.M.	with less violence, at Lancaster, Liverpool, Birmingham, Derby, Chester, York, Gains- borough, over a space of 130 or 140 miles in diameter.	in the space of half a minute. Direc- tion = S.W. to N.E.	.....	.....
— 30. Macaluba near Girgenti,	Several shocks .....	.....	.....	.....	Dolomieu, Voyage, &c. p. 160; Fer- rara, Campi Flegrei, p. 43.
Half an hour after the rising of the sun.	Sicily.	.....	.....	.....
— Oct. 1. Lisbon, more violent at	Smart shocks .....	.....	.....	.....	Gazette de France, 17 Nov.; Cotte.
6 A.M.	the castle of Cintra.	.....	.....	.....

1777. Oct. 1. Kinsale in Ireland	An earthquake.....	.....	.....	.....	Cotte, <i>loc. cit.</i>
Hour not given.					
5. In the territory of Siena.....	Violent shocks .....	.....	.....	Houses were thrown down at Radicofani. Clefts opened in the ground.	Gazette de France, 24 Nov.; Cotte.
Toward evening.					
16. Florence. Also at Lucca.	An earthquake .....	.....	.....	Occurred in the midst of a violent storm	Cotte, <i>loc. cit.</i> ; Annual Register.
21. La Guayra and Cumana.	Ditto .....	.....	.....	In consequence of this earthquake an annual nocturnal procession was instituted. v. Hoff gives the date 1778.	Humboldt, Voyage, &c. t. v. p. 5.
1 A.M.					
Nov. 14. Sundval in Sweden, and the environs.	A violent shock, lasting 1½ minute.	Succeeded by a sudden reflux of the sea, which caused the river flowing through the town to inundate its banks.	.....	Accompanied by a low noise, in the direction N.E. to S.W. Several claps of thunder were heard after the shock.	Gazette de France, 5 Janv. 1778; Cotte.
5½ P.M.					
Dec.	Several shocks.....	.....	.....	The weather was unusually cold for the climate.	Gazette de France, 9 Fév. 1778.
1778. Jan. 18. Hermannstadt in Transylvania, and on the borders of Moldavia and Wallachia.	Shocks for half an hour.	.....	.....	A church at Cronstadt, on the frontiers of Moldavia and Wallachia, was thrown down. Many persons who were in it perished.	Gazette de France, 6 Mars; Cotte.
19. Leghorn and Tivoli.....	Two slight shocks .....	.....	.....	.....	Ditto.
About 9 ^h 45 ^m and 9 P.M.					
In Rome	A slight shock.....	.....	.....	.....	Gazette de France, <i>loc. cit.</i>
the course of the month.					
Feb. 18. Uglian-Caldo in Tuscany	Some shocks, followed for half an hour by a less perceptible oscillatory motion.	.....	.....	.....	Ditto, 30 Mars; Cotte.
April 2. Mannheim	A trembling motion.....	.....	.....	.....
20. Parma	Rather a slight shock	.....	.....	.....	Cotte, <i>loc. cit.</i> ; Bertholon, <i>Électricité des Météores</i> , t. i. p. 291.
5 ^h 45 ^m P.M.					Gazette de France, 5 Juin; Cotte.
30. Guastalla	Rather a smart shock	.....	.....	.....	Gazette de France, 8 Juin.
4 ^h 15 ^m (A.M. or P.M.?).					
May 5. Aleppo.....	An earthquake. ....	.....	.....	Accompanied by unusual cold	Ditto, 10 Août et 11 Sept.; Cotte.
5 ^h 10 ^m A.M.					

1.	2.	3.	4.	5.	6.
1778. May 10.	Tief-Hartmannsdorf, in the government district of Liegnitz, circle of Schönau, Silesia.	A trembling.			Econom. Nachrichten der Gesellschaft in Schlesien, B. 6. s. 180.
— 22. Augsb.		A heavy shock.			Gazette de France, 12 Juin; Cotte.
3 ^h 30 ^m A.M.					
— 25. Uln		Another shock			Ditto.
— June 7.	Grenada in Spain. Also on this day at Pau and other places in the Pyrenees, and as far as Bordeaux.	At Grenada a very severe shock, lasting some seconds.			Gazette de France, 7 Août; Cotte.
Between noon and 1 p.m.					
— 11. At Padua.	Also, on the same day, at Forli in the Romagna.		On the 25th of this month an extraordinary motion of the sea was observed at Malta. No shock is mentioned.		Toaldo, <i>loc. cit.</i> ; Cotte.
8th hour (Italian time).					
— 16. Smyrna		A very violent earthquake. Slight shocks occurred daily up to the 3rd July.		Many buildings were thrown down	Annual Register, vol. xxi. p. 193; Gazette de France, 14 Sept.; Cotte.
— 18. Béon,	in the valley of Ossau in the Pyrenees, and at other places in this region.	Another shock.			Palassou, <i>loc. cit.</i> p. 267.
11 A.M.					
— July 3.	Smyrna	A very violent earthquake. Two shocks of great violence were followed by twenty-four feebler, and slight motion until midnight of the following day.		Most of the city was either ruined by the shocks or destroyed by fires which broke out during the time. Each concussion was preceded by a subterranean noise like the firing of cannon.	Annual Register, &c. <i>loc. cit.</i>
7 to 10 A.M.					
Cotte and the Gazette de France give the date 2nd July.					
— 5.	Ditto	Five or six slight shocks having been felt on the 4th, nine very violent ones			Ditto.
From 1½ to 8 A.M., and even up to					

[illegible]

1.	2.	3.	4.	5.	6.
1778. Nov. 18. Trieste..... 11 A.M.		A slight (or according to the Merc. de Fr. a very severe) shock. A shock		Accompanied by a violent storm with thunder. v. Hoff gives the date 1779.	Gazette de France, <i>loc. cit.</i> ; Merc. de Fr. 15 Janv. 1779, p. 209. Toaldo, <i>loc. cit.</i>
— — — — — Padua					
18th hour (Ita- lian time).					
— — — — — Dec. 19 In Hungary, at Ha- nuna, Wranow, Ta- to 26. verna, &c.		Twelve shocks during this period.		Bertholon places this event in 1779	Cotte, <i>loc. cit.</i> ; Bertholon, Elec. des Mét.
— — — — — 31. La Conception, near Domfront (departement Orne) in Normandy.		An earthquake.....			Ditto; Mém. de l'Institut, t. iv. p. 533; v. Buch, Canar. Ins. s. 375.
— — — — — At the abbey of San Sal- vadore (in Italy, but in what state?).		Some absolutely local shocks, not felt be- low the mountain.			Sarti, Saggio di Congettura su i Ter- remoti, cap. 2.
1779. Jan. 25. Caraccas in the province 5 ^h 40 ^m P.M. of Cumana, S. Ame- rica.		A violent earthquake, recurring as severely in three hours after- wards.		Houses thrown out of the perpendicular	Gazette de France, 8 Juin; Cotte.
— — — — — Feb. 5. Orizaba in Mexico		An earthquake.....			Cotte, <i>loc. cit.</i>
— — — — — Canea, in the island of Night between Candia. 9 and 10.		Three shocks from E. On the 4th March an extraordinary rise of the waters of the Baltic was observed. No shock mentioned			Gazette de France, 15 Oct.; Cotte.
— — — — — April 6. Hamouna in Hungary....		An earthquake			Cotte, <i>loc. cit.</i>
— — — — — 16. Constantinople		Ditto, consisting of two shocks.		The second shock awoke every one in Constan- tinople.	Mercure de France, 15 Juin, p. 195; v. Hoff.
— — — — — 4 $\frac{1}{2}$ A.M.					Gazette de France, 9 Juillet et 10 Sept.; Le Comte de Chabot in the Journ. de Phys. t. xiv. p. 198.
— — — — — June 1. Bologna		A violent shock, last- ing 3 seconds. Two others were felt du- ring the next two hours, and the earth trembled slightly all the night.			
— — — — — About mid- night.					
— — — — — Padua		Another shock.....			Toaldo, <i>loc. cit.</i>
5th hour (Ita- lian time).					
— — — — — 2. Bologna		A shock of equal in-			Gazette de France, &c. <i>loc. cit.</i>

6 A.M.						
1779. June 4. 7½ A.M.	Ditto	.....	.....	.....	Walls were cracked. On the 7th meteors were observed like a rain of fire at the mountain St. Michael in Bosco.	Ditto.
.....	Padua	.....	.....	.....	.....	Toaldo, <i>loc. cit.</i>
11th hour (Italian time).	.....	.....	.....	.....	.....	Ditto.
12h 55m (Italian time).	8. Ditto	.....	.....	.....	.....	.....
.....	10. Bologna	.....	.....	.....	The weather was calm, but cloudy. During the second shock a loud noise was heard in the air. The water in wells became warmer, and the magnetic needle deviated 3°. A letter from Rome, dated 18th August, says that the shocks still continued at Bologna.	Gazette de France, &c. <i>loc. cit.</i>
9h 5m A.M.	.....	.....	.....	.....	.....	Toaldo, <i>loc. cit.</i>
14th hour (Italian time).	.....	.....	.....	.....	.....	.....
.....	26. Sienna	.....	.....	.....	.....	Soldani, quoted by Pilla.
1h 30m P.M.	.....	.....	.....	.....	.....	Gazette de France, 24 Septembre; Cotte.
.....	July 1. Smyrna	.....	.....	.....	.....	Gazette de France, 14 Sept.; v. Hoff.
.....	14. Rouen in France, and on the same day at Larsebø-Sagewerekin Helsingland, Sweden.	.....	.....	.....	.....	Ditto.
.....	22. In Sweden; probably at the same place.	.....	.....	.....	.....	.....
.....	Aug. 8. Around Vesuvius, especially at Portici.	.....	.....	.....	Windows were broken and walls cracked at Portici. Accompanied by a rolling noise in the interior of the volcano, which had been in violent eruption since the 29th July, and continued so until the 26th August.	Hamilton in Phil. Trans. vol. lxx. pp. 42-84; Ditto in Suppl. to Campi Flegrei, p. 292; Vivenzio, &c.

1.	2.	3.	4.	5.	6.
1779. Sept. 21. Bergen in Norway Between 4 and 5 A.M.		A trembling shock			Gazette de France, 19 Nov.; Cotte.
— Oct. 1. Naples 1 A.M.		Violent horizontal shocks from E. to W.			Gazette de France, 5 Nov.
— 20. Saint Giron in the Py- renees.		A slight shock, follow- ed in three-quarters of an hour by a stronger vibration from N.W. to S.E., lasting 1 second.		Accompanied by a dull subterranean noise, that with the second shock being the louder. Some stones were thrown from the town walls.	Palassou, <i>loc. cit.</i>
— Nov. 2. Vivonne in Poitou		One shock			Cotte, <i>loc. cit.</i>
— 9. Bologna		Two more shocks, one of them rather severe.			Ditto; Gazette de France, 21 Déc.
— 23. Padua		More shocks		During an eclipse	Toaldo, <i>loc. cit.</i>
2nd hour (Ita- lian time).					
— Dec. 1. Vienna		An earthquake shock			Cotte, <i>loc. cit.</i>
— 5. Bergen, between Hanau and Frankfort.		Ditto			Ditto.
— 12. Portici and Resina, near Naples.		Rather a violent hori- zontal shock.			Ditto; Gaz. de Fr. 21 Janv. 1780.
— 22. Valley of Ossau in the Pyrenees.		One shock			Palassou, <i>loc. cit.</i>
— About 6 P.M.		A violent shock		Commotions of this kind were frequent here, especially in the mountain country at San- Marcello and Categliano.	Gazette de France, 22 Fév. 1780; Cotte.
— About 6 P.M.					Palassou, <i>loc. cit.</i>
— 28. Valley of Ossau in the Pyrenees, and particu- larly at Nay.		A vibratory shock from S.W. to N.E., more violent than that of the 22nd.			Palassou, <i>loc. cit.</i>
— 31. Pistoia again		Another shock.....			Gazette de France, &c. <i>loc. cit.</i>
About 6 P.M.					
1780. Jan. 15. Padua		Another shock			Toaldo, <i>loc. cit.</i>
6th hour (Ita- lian time).					
— 20. Mont Dauphin and Em- brun in Dauphiny.		A shock from S. to N., lasting 2 seconds.		Accompanied by subterranean noise at Mont Dauphin.	Gazette de France, 18 Fév.; Cotte.
Half an hour after midnight					

Or 21st?) 1780. Jan. 27. Malta 6 P.M.	Three violent shocks, .....	.....	The fortifications were injured	Gazette de France, 4 Avril; Cotte.
— (according to others, on the 22nd.)	An earthquake.....	.....	.....	Hist. Gén. des Voyages, t. ii. p. 401; Raffles' History of Java, vol. ii. p. 234, and Append. p. 7; Verhan- del. van het Batavian Genootsch. D. 2. BL 51.
— 28. Mount Etna	A trembling.....	.....	The volcano had remained at rest for 14 years....	Ferrara, Descrizione del Etna, p. 125.
— Towards the end of the month.	Severe shocks.....	.....	This fact is obviously connected with, if not merely the same as the preceding.	Gazette de France, 6 Juin et 4 Août.
Feb. 2. Auvergne in Nibousan, France (?)	An earthquake .....	.....	.....	Cotte, loc. cit.
— 5. Padua	Another shock .....	.....	.....	Toaldo, loc. cit.
— 11th hour (Ita- lian time).	Ditto .....	.....	.....	Ditto.
— 9. Ditto .....	.....	.....	.....	.....
— 18. Selb in the Voigtland of Baireuth.	Continuous shocks .....	.....	.....	Ziehen, Nachricht von einer bevor- stehenden grossen Revolution der Erde, 1783, 11-23 and following pages.
— 23. Ditto	Ditto, more violent, followed by others at 3 (A.M. or P.M.?) the same day.	.....	.....	Ditto.
— About same hour.	Ditto, very sensible....	.....	The glasses on the tables were made to ring ...	Ditto.
— 24. Ditto .....	.....	.....	.....	Ditto.
— 2 ^h 45 ^m P.M.	Throughout the whole of A the country round Wetzlar and Königs- berg. Also, though feeble, at Breitenbach.	.....	Heavy snow and wind the day before	Ditto.
Between 6 and 7 P.M.	.....	.....	.....	.....
9 ^h 18 ^m P.M. Selb again	A final shock. All those felt at this place appeared to come from the S.W.	.....	.....	Ditto.

1.	2.	3.	4.	5.	6.
1780. Feb. 26. Between mid- night (of the 25th) and 1 A.M. In the morn- ing.	Coblentz	A severe shock .....	.....	.....	Ziehen, Nachricht von einer bevor- stehenden grossen Revolution der Erde, 1783, 11-23 and following pages.
A little before 5 ^h 30 ^m P.M.	Wetzlar	Two shocks felt this morning, and one on the following day. A much heavier shock than that at mid- night.	.....	.....	Ditto.
6 P.M.	Coblentz	A shock lasting not less than a minute. A severe shock from S. to N., followed by another (feebler) the following morn- ing between 4 and 5 A.M.	.....	Accompanied by loud noise, both under ground and in the air.	Ditto.
6 ^h 35 ^m P.M.	Dachsenhausen (Hesse- Darmstadt). Boppard on the Rhine...	A shock lasting not less than a minute. A severe shock from S. to N., followed by another (feebler) the following morn- ing between 4 and 5 A.M.	.....	It was remarked that several clocks had stopped on the evening of the 25th. At 7 ^h 45 ^m P.M. a violent gust of wind from the west was per- ceived at Wiesbaden, Frankfort on the Maine, &c., but decreasing in violence the further it extended from the Rhine.	Ditto.
— — — 27. 4 ^h 45 ^m A.M.	Coblentz	A feeble shock, but lasting a long time. Another, still slighter.	.....	.....	Ditto.
10 ^h 30 ^m A.M.	Ditto .....	.....	.....	The heavens looked unusually stormy. At St. Gothard slight motion had been observed, par- ticularly on the 22nd at 7 P.M. And in the course of the month the lake of Wallenstadt and the river Reuss exhibited agitation, du- ring which the earth shook, particularly at Lucerne. Many of these shocks on the Rhine probably occurred in reality at the same hour.	Ditto.
— — — End of the month, and on March 3.	Tabriz in Persia	A violent earthquake.	.....	Did great damage	Cotte, loc. cit.
— — — Mar. 13.	Etna and throughout almost the whole of Sicily.	Trembling shocks ...	.....	.....	Ferrara, Descrizione, &c. loc. cit.; Gazette de France, 6 Juin.
— — — 28.	Sicily and Calabria.....	Ditto .....	.....	.....	Cotte, loc. cit.: Gazette de France.

lages. 29. La Rochelle and Roche- fort in France.	A trembling.....	.....	.....	.....	Cotte, <i>loc. cit.</i>
May 2. The Limousin, Poitou, St. Aunis, and in Brit- tany.	Several shocks .....	.....	.....	.....	Ditto.
9. Bologna	Aratherviolent shock, accompanied by a very distinct oscil- lation. Two days after, a slighter shock.	.....	.....	Accompanied by noise. An extraordinary mass of vapour was observed in Sicily. v. Hoff, quoting Cotte, gives the date 8th May.	Gazette de France, 20 Juin.
18. Etna, and many other places in Sicily, ex- tending into Calabria. Also in the Lipari Isles.	Many shocks every day up to the 25th. Others had been felt repeatedly since the end of April, and Messina was shaken almost the whole summer. At Ali and Fiume di Niso the shocks were sometimes so sudden and violent that every one be- lieved that a new volcano was about to burst forth there.	.....	.....	Etna was in violent eruption until the 16th June. Vulcano also was in continual agitation, ac- compnied, as at Etna, by frightful noise.	Gazette de France, <i>loc. cit.</i> et 27 Juin; Ferrara, Descrizione, &c. p. 126; Dolomieu, Voy. aux îles Lipari, pp. 28 et 79; Mém. sur les trembl. de terre de la Calabre en 1783, p. 69.
25. Rimini, Ravenna, and Caserta (Casero ?). Padua	Tremblings .....	.....	.....	.....	Cotte, <i>loc. cit.</i>
21st ^h 45 ^m (Ital. time). July 30. Genoa	Another shock .....	.....	.....	.....	Toaldo, <i>loc. cit.</i>
10 P.M.	A very slight shock, lasting some se- conds.	.....	.....	.....	Gazette de France, 8 Sept.; Cotte.
Aug. 1 to 4. At night.	Several rather smart shocks.	.....	.....	.....	Gazette de France, 19 Sept.; Cotte.

1.	2.	3.	4.	5.	6.
1780, Aug. 29. 8 ^h 3 ⁴ A.M.	Hafodunos, Downing, Isle of Anglesca, Carnar- von, Lie of Llyd, Pen- high, Holywell, Flint, Coarw, Caumaris, Garnest and Holyhead. Lisbon	At Hafodunos (at 8 ^h 37 ^m 30 ^s) two shocks from S.E. to N.W. At Downing two severe shocks from N.W. to S.E. A slight shock		The barometer was not affected at Hafodunos. Phil. Trans. vol. lxxi. pp. 193 and At Downing a noise like that of waggons was heard before the shocks.	
— Night between 29 and 30.					Gazette de France, 3 Oct.; Cotte.
— Sept. 11.	Porta in Sicily	An earthquake		Perrey says, "Ne faut-il pas lire Patti?"	Cotte, <i>loc. cit.</i>
— 21. 2 ^h 15 ^m P.M.	Regusa	Three violent shocks. The first two suc- ceeded each other almost without any interval, and lasted sixty seconds. Di- rection = E. to W.		Houses were injured	Gazette de France, 1 Déc.; Cotte.
— 27. — Oct. Probably the beginning of this month.	Christiania in Norway... Island of Candia	An earthquake A very violent earth- quake, preceded by others for some time.		The castle of Eropeter with its garrison of 300 Turks was swallowed up. Thirteen small villages and their inhabitants disappeared in like manner.	Cotte, <i>loc. cit.</i> Merc. de France of 11 Nov. p. 56, quoting "la rubrique" of Leghorn of the 15th Oct., which quotes letters from Trieste.
— 5. 5th hour (Ital. time).	Padua	Another shock			Toaldo, <i>loc. cit.</i>
— 13. — 31. 3 ^h A.M.	Tornea in Lapland Dijon. Bourbonne-les- Bains Haute-Marne), Vaivre and Vesoul, in France.	One shock At Dijon several rather violent shocks. At Bourbonne-les-Bains they were violent, and in the direction S. to N. At Vaivre and Vesoul one oscillatory shock from W. to E., of four seconds' dura- tion; followed in half an hour by a		Keilhan reports this event on the 15th At Dijon accompanied by a noise like that of a carriage rolling rapidly over pavement. At Vaivre and Vesoul an undulating sound was heard, and in the middle of it a sudden low explosion. The second shock threw down furniture.	Cotte, <i>loc. cit.</i> ; Keilhan, <i>loc. cit.</i> Gazette de France, 10 et 14 Nov., 1 Déc.; Cotte.

and 5 P.M.	Hagenau in Alsace	N.E. to S.W.	.....	.....	.....	Cotte, <i>loc. cit.</i>
11.	Newcastle, York, Leeds, Whitehaven, &c.	One shock .....	.....	.....	.....	The Annual Register, vol. xlii. p. 77.
18.	.....	Lasted about 2 secs....	.....	.....	.....	.....
4½ P.M.	.....	.....	.....	.....	.....	.....
1781.	Island of Amboyna.....	An earthquake .....	.....	.....	.....	Annalen der Physik, 30. S. 192.
Jan. 2.	In the most elevated por- tion of the province of Sienna.	Various shocks during the month, especially on this night.	.....	.....	.....	Gazette de France, 15 Fév.; Cotte.
At night.	Erzeroum in Armenia....	A violent earthquake.	.....	.....	.....	.....
27.	Messina in Sicily	Several shocks .....	.....	.....	.....	Cotte, <i>loc. cit.</i> ; Huot, <i>loc. cit.</i>
Feb. 13.	Arricia in Italy (La Riccia?)	An earthquake .....	.....	.....	.....	Gazette de France, 13 Avril; Cotte.
25.	.....	.....	.....	.....	.....	Cotte, <i>loc. cit.</i>
April 4.	Padua	One shock .....	.....	.....	.....	Toaldo, <i>loc. cit.</i>
10 P.M.	.....	.....	.....	.....	.....	.....
Hour not given.	In the Romagna, especially at Modigliana; at Castrocaro, Forli, and slightly at Florence, Faenza, and Venice. Also at Bologna.	Severe shocks .....	.....	.....	.....	The houses in the Romagna were cracked, and the pavement of the streets broken up. At Castrocaro a mountain separated into two parts. At Forli chimneys were thrown down.
10.	In the Romagna again, at Faenza, Imola, Cesena, and Bologna.	Ditto. At Bologna a long and very heavy shock.	.....	.....	.....	Ditto.
3 P.M.	.....	.....	.....	.....	.....	.....
16.	St. Maurice le Girard in Poitou.	One shock .....	.....	.....	.....	Cotte, <i>loc. cit.</i>
24.	Padua	Another shock .....	.....	.....	.....	.....
3rd hour (Italian time).	.....	.....	.....	.....	.....	.....
26.	Arles in Provence	Several shocks .....	.....	.....	.....	Cotte, <i>loc. cit.</i>
May 4.	In the environs of Etna	A slight shock from N. to S., felt more strongly further away.	.....	.....	.....	Phil. Trans. vol. lxxii. p. 6; Ferrara, <i>loc. cit.</i>
21½ 15 ^m (Italian time).	.....	Many other violent shocks were felt during the month.	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
June 3. Padua 4.5 ^m (Italian time) not given	Another shock				Toaldo, <i>loc. cit.</i>
Capli in the duchy of Urbino, and in the Romagna. Also at Borgo-San-Sepolcro, apparently coming from Mounts Nero and Jago, and extending to Anghiari, Arezzo, and other places in Tuscany and the Romagna.	At Borgo-San-Sepolcro a severe shock from S.E. to N.W. The earth continued to tremble almost the whole day.			At Borgo-San-Sepolcro walls were cracked. The spring had been dry, but the summer was stormy.	The Cotte, <i>loc. cit.</i> ; Pilla quotes Sarti, <i>loc. cit.</i>
20. "Railage" of Orzelle in Franche Comté.	Accompanied by an inundation.				Cotte, <i>loc. cit.</i>
July 1. The shocks extended all along the Adriatic, and were felt at Ancona, Sinigaglia, Rimini, and other places in the States of the Church.	Severe shocks continued to be felt.			The town of Cagli was abandoned. Monte Nero Gazette de France, 7 Août; Hamilton.	
Florence and Faenza ...	Some shocks were felt				Gazette de France, 17 Août et 4 Sept.
15. Liabon	A rather severe earthquake, lasting some seconds.				Ditto, 24 Août; Cotte.
Padua	Another shock				Toaldo, <i>loc. cit.</i> ; Ephém. de Mannheim, 1781, pp. 281, 282.
17. Florence, Faenza, and Marseilles.	A very violent and sudden shock, followed by a rapid oscillation from E.			The earth rose circularly from S. to N. more than once.	Gazette de France, 17 Août et 4 Sept.; Cotte.

13 ^h 55 ^m (Italian time). 1781. Aug. 14.	Padua	The motion was almost continual up to the 22nd. Another shock .....	.....	.....	Toaldo and Ephém. de Mannheim, <i>loc. cit.</i> Gazette de France, 5 Oct.; Cotte.
— Sept. 10. 5 A.M.	Padua	One shock on this day, five others were felt during the month. Another shock.....	.....	.....	Ephém. de Mannheim, 1781, p. 285.
17th hour (Italian time).	Milan, Mantua, Lodi and Crema.	At Milan a rather severe shock. At Mantua an undulatory motion, lasting five seconds, and felt more strongly at Lodi. At Crema, the motion (undulatory) was from E. to W., and lasted 1 minute.	.....	.....	Gazette de France, 12, 19 et 30 Oct.; Cotte.
— 22.	At the lake of Bracciano, between Rome and Viterbo.	Accompanied by an extraordinary motion of the waters of the lake.	.....	.....	Cotte, <i>loc. cit.</i>
— 23.	Harderwyck on the Zuydersee.	A trembling shock .....	.....	.....	Ditto.
— Oct. 2.	Jamaica	Several severe shocks	The sea rose to the height of 10 feet at half a mile from its ordinary beach, and swept away numbers of houses.	Accompanied by a tremendous hurricane. v. Hoff, Annual Register, vol. xxiv. p. 3; on the authority of Cotte, gives the date 2nd October, 1780.	Cotte.
— and 7.	Presburg in Hungary ...	Vibratory shocks.....	.....	.....	Cotte, <i>loc. cit.</i>
— 10. 3rd to 5th hour (Italian time).	Faenza and Berzighella.	At Faenza 3 shocks, and at Berzighella eleven were counted	.....	.....	Gazette de France, 16 Nov.; Cotte.
— Nov. 17. 10 A.M.	Padua	A slight shock.....	.....	.....	Ephém. de Mannheim, 1781, p. 288.

1.	2.	3.	4.	5.	6.
1. Nov. 22. Padua ... P.M.		A slight shock...		The magnetic needle was agitated	Ephém. de Mannheim, pp. 289 et 292.
2. Jan.	Beneventum, Naples, &c.	More shocks		Such numerous earthquakes had occurred in Italy the year before that the pope ordered public prayers to be offered up for their cessation. The walls were shaken to their foundations, and the next morning, at 3 A.M., a neighbouring hill covered with trees left no trace but a frightful chasm. The whole of its summit had fallen into the sea, and there formed a peninsula of 300 feet long by 1200 wide.	Bertholon, Électricité des Météores, t. i. p. 292. Gazette de France, 17 Mai.
Feb. 25. ... hour before the ... Angelus.	Ortona on the Abruzzo ... Chetum.	Very violent			
March 3.	Beneventum in the king- dom of Naples.	An earthquake			Cotta, loc. cit.
April 5.	La Rochelle in France.	Ditto			Ditto.
May 15.	In the county of Trent. No shock is mentioned, possibly only a landslip	Probably an earthquake, though the event does not seem well authenticated.		A chasm opened during a storm, and fifty-three houses were swallowed up.	Perrey, Suppl. to memoir on Earth-quakes in the basin of the Danube, p. 76.
23.	Near the lake of Bruso in Westmorland, Sweden	Probably an earthquake, though the event does not seem well authenticated.	A loud noise was heard, like thunder, and the waters of the lake rose in an extraordinary manner, producing a terrible inundation. On the 22nd the sea rose with great violence on the coast of Formosa and the adjacent part of China, and remained eight hours above its ordinary level, having swept away all the villages along the coast, and drowned immense numbers of people.		Neue Abb. der Akad. zu Stockholm (German translation), B. 3. S. 312; Annual Register, vol. xvi. p. 35.

1782. July 17.	Guadaloupe.....	A vibratory shock .....	.....	Lustres and bells were set in motion in the upper stories of the houses. Walls were cracked. The barometer was agitated. v. Hoff gives the date 25th August.	Cotte, loc. cit. Gazette de France, 30 Août; Cotte.
— Aug. 15.	Grenoble in France..... 4½ P.M.	Violent oscillations from E. to W.	.....	.....	Palassou, loc. cit. p. 268.
Sept. 15.	Oléron on the southern slope of the Pyrenees.	A violent oscillation, following the direction of the chain of the Pyrenees from the Atlantic Ocean to the Mediterranean.	.....	.....	.....
Oct.	Rome	A rather smart shock	.....	.....	Gazette de France, 12 Nov.
Some days before the 7th.	.....	.....	.....	.....	.....
5. 8½ 39 ^m P.M.	Mold in Flintshire, Almonk in Denbighshire, Bangor in Caernarvon, at St. Asaph, and in the Isle of Anglesea.	A rather violent shock, lasting 15 seconds. At Bangor two shocks were felt at the hour specified. At Bodorgan in Anglesea the shock was very violent, from N.E. to S.W.	.....	Accompanied by a noise like carriages rolling over pavement.	Phil. Trans. vol. lxxiii. p. 104.
— — —	Guadaloupe.....	Another shock.....	.....	.....	Cotte, loc. cit.
Night between 13 and 14.	Bergen in Norway	A slight earthquake....	.....	v. Hoff, quoting Cotte, gives the date 15th October.	Gazette de France, 26 Nov.; Cotte.
Dec. 9.	Vienne in Dauphiny. Also in Béarn.	Ditto .....	.....	.....	Cotte, loc. cit.; v. Hoff.
— 26 and 27.	Oléron on the southern slope of the Pyrenees.	More oscillations.....	.....	.....	Cotte, loc. cit.; Palassou, loc. cit.
End of the year.	Comorn in Hungary ...	.....	.....	The town had been almost entirely destroyed by an earthquake, according to a letter from Vienna of the 4th January 1783.	Gazette de France, 28 Janv. 1783.
Jan. 6. 1783.	In the Altai mountains in Siberia, especially on the Irtysh.	Several shocks.....	.....	.....	Kefenstein.
— 10.	Marseilles	A vibratory shock .....	.....	.....	Cotte, loc. cit.
20 th A.M.	.....	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
1. Jan. 27.	Sienna and on the coast of Tuscany.	An earthquake which does not seem to have recurred during the disturbances in Calabria.			Pilla quotes Soldani.
Feb. 5.	Throughout Calabria and Sicily. The centre of disturbance was, according to Hamilton, under the town of Oppido; others place it beneath Monte Asperio or Aspromonte in the Apennines; while Dolomieu considers that there were three distinct centres, Oppido being the principal one. Hamilton says that if two circles be drawn with the latter town for their common centre, and with radii of twenty-two and seventy-two Italian miles in length, the smaller one will include all the places where the earthquake was felt with destructive violence, while the larger will circumscribe the whole district shaken. Some of the shocks extended to the Romagna; and even Rome itself, and to the Lipari Isles.	One of the most disastrous earthquakes ever felt in Europe. After some slight oscillations the tremendous shock which did so much mischief took place, lasting about two minutes. The motion seems to have been very complex, and was divided by the Italians into three kinds, "verticale, oscillatorio, e vorticoso." At Oppido the shocks seemed to come up vertically from beneath. Many other violent shocks were felt, especially during the night of the 6th, on the 7th at 1 1/2 p.m., and almost continuously with more or less violence up to the 28th March. Those of the 23rd, 27th, and 28th of February, and the 1st and 28th of	The sea in the straits of Messina was violently agitated, retreating suddenly, leaving the shore dry to a great distance, and then as suddenly coming back with such rapidity and violence as to carry off numbers of people who had fled from their houses to the shore on account of the earthquake.	All the towns and villages of Calabria were shaken with tremendous violence. Those built on loose detrital foundations were levelled with the ground, while those situated on solid rock, though greatly shaken, for the most part remained standing. On the 28th of March, however, the contrary seemed to be the case. Those on the east of the Apennines suffered less than those on the west. The devastation throughout the "Plain" of Calabria and Sicily was awful. In both regions a subterranean murmuring noise was heard before the shock; in Calabria it seemed to come from the S.W. At Scylla (Straits of Messina) a portion of a mountain fell into the sea (on the night of the 5th), when great damage was done in Sicily by the great sea wave resulting from its fall. Tremendous effects were produced over the surface of Calabria, hills were overthrown and levelled with the plain, chasms opened in the ground and swallowed up people in the moment of their flight, springs dried up, the course of rivers was stopped for a moment, to be renewed immediately after with such violence as to tear away every obstruction. Stromboli, which under ordinary circumstances constantly emits smoke, ceased almost, if not altogether, to do so on this day. Etna and Vesuvius were also perfectly still. The weather was unusually still and gloomy, like that which often precedes great thunderstorms, and immediately before the shock a heavy, whistling blast of wind was observed.	Hamilton in Phil. Trans. vol. lxxiii. p. 169; Vivianio, <i>Istoria e Teoria de' tremuoti</i> , &c., Napoli, 1785; Vivianio, <i>Istoria de' tremuoti avvenuti nella provincia della Calabria</i> , &c., Napoli, 1788; Grimaldi, <i>Descrizione de' tremuoti accaduti nell Calabria nel 1783</i> , Napoli, 1784; <i>Istoria de' Fenomeni del terremoto avvenuto nelle Calabrie</i> , &c., Napoli, 1784; Lyell's <i>Principles of Geology</i> ; v. Hoff; Dolomieu, <i>Mémoire sur les tremblemens de terre ressentis en Calabre en 1783</i> .

<p>in the region mentioned above.</p>	<p>(under the so-called vorticosi), lasting two minutes, completed the destruction of the 5th February. On the 25th and 26th April, the 5th May, the 8th, 11th and 12th June, the 29th July (at 1 and 6 A.M.), and the 30th August, severe shocks were felt, and in Calabria the motion had not ceased on the 20th September.</p>	<p>the sea bottom itself sank considerably at the same place. At Terranova a church tower was split in two by a cleft running from top to bottom, and the one-half with the foundation raised considerably (producing what in rocks would be called a "fault"). At the monastery of S. Bruno some stones lying upon others were moved horizontally upon the lower ones, without the place of the latter being altered. In some places the earth appeared cleft by star-shaped fissures, like a cracked pane of glass. This year was remarkable for the extraordinary dry fog, which beginning in Calabria in February, overspread until autumn the greater part of Europe, and extended even to the Azores. This fog, though not consisting apparently of moisture, was so dense that the sky was quite obscured, appearing a light grey colour instead of blue, and the sun presented a blood-red disc. In Calabria the darkness was so great that lights were obliged to be used in the houses, and vessels at sea repeatedly came in collision. The odour was most disagreeable. For further details of this most remarkable earthquake see the various memoirs referred to.</p>	<p>1783. Feb. 13. Neustadt in Hungary ... — middle the month. of the month. — 18. Between mid- night (of the 17th?) and 1 A.M.</p>
<p>Some slight vibratory shocks.</p>	<p>Some slight vibratory shocks.</p>	<p>Some slight vibratory shocks.</p>	<p>Gazette de France, 14 Mars; Cotte; v. Hoff.</p>
<p>An earthquake felt throughout the whole island.</p>	<p>An earthquake felt throughout the whole island.</p>	<p>An earthquake felt throughout the whole island.</p>	<p>v. Hoff quotes Labillardière.</p>
<p>Several shocks from the S.W.</p>	<p>Several shocks from the S.W.</p>	<p>Several shocks from the S.W.</p>	<p>Gazette de France, 8 Avril; Ziehen, loc. cit. p. 46; Cotte; v. Hoff.</p>

1.	2.	3.	4.	5.	6.
Feb 25, 7 18 P.M.	South in Upper Saxony.	Several shocks from the S.W.			Gazette de Franco, 8 Avril; Ziehen, <i>loc. cit.</i> p. 46; Cotte; v. Hoff.
— 28 P.M.	Pal room in Sicily	Several slight shocks felt during the month, that on 15 day being rather more severe.		Perry considers this and the other Italian earthquakes given by him further on as distinct from those of Calabria. It is difficult to believe however that they were not at least closely connected therewith.	Gazette de France, 2 Mai.
March 5	Paris	Several shocks		The Gentleman's Magazine is the only authority I have been able to find for this event, which is not mentioned by either Perry or v. Hoff. It appears therefore somewhat doubtful.	Gentleman's Magazine, vol. llii. p. 268.
— 6 P.M.	In the Angoumois (now a department of France)	A shock 1 string two		On the 9th a mountain fell at Ardes in Auvergne. No mention made of any shock.	Gazette de France, 1 Avril; Cotte.
— our not zen.	At Irkutsk, and along the Alta chain, from Lake Baikal to the Altai kodywan	Several shocks			Gazette de France, 25 Juillet; Cotte; v. Hoff; Humboldt, <i>Asie Centrale</i> , t. ii. p. 112.
— 18 43 rd A.M.	Padua	An earthquake from S. to N.			Ephém. de Mannheim, 1783, p. 567.
— 25 A.M.	Valenmort in Provence	Two shocks. According to v. Hoff shocks were felt here also on the 26th.		Preceded by a loud noise. At Salton-de-Cran, three leagues from Valenmort, the weather was clear and fine, yet the electrical machine gave but very feeble sparks (a very uncertain subject of observation). A strong wind, without a fixed direction, succeeded the shocks, and lasted for an hour.	Gazette de France, 18 Avril; v. Hoff.
— of 25-26.	Sell in Upper Saxony	More shocks			Ziehen, <i>loc. cit.</i>
— 26.	Vence, Padua, S ^a Maria, Zante, and Cephalonia.	Shocks felt at all these places, according to v. Hoff.			v. Hoff.
— 28.	In Calabria	A very violent shock. (See 3th Feb.)			Ditto.
April 5.	Mannheim	Several shocks			Ditto.
— 8.	Vienna; Comora, and	An earthquake		It is hardly likely that this is a distinct event.	Gentleman's Magazine, vol. llii. p. 268.

1783. Apr. 11.	Comorn in Hungary	.....	.....	The fortress was destroyed	Férussac, Bull. des Sc. Nat. t. xviii. p. 195. Ziehen, <i>loc. cit.</i>
— 12.	Selb in Upper Saxony	Another shock, so violent that the inhabitants believed their houses about to fall.	.....	.....	.....
— 13.	Lisbon. Also at St. Jago in Galicia.	Three severe shocks at Lisbon. One only, but that a violent one, at St. Jago.	.....	.....	Gazette de France, 12 Juin; Cotte.
— 22. 4 A.M.	Comorn, along the Danube, at Raab, Presburg, Pesth, Buda, Odimburg, and Estherhaz in Hungary. Also at Vienna. The centre appeared to be at Comorn.	Very violent. At 10 A.M. twelve severe shocks had been reckoned at Comorn. The first at that place was from S. to N. At Offen-Pesth slight shocks had been felt from 2 A.M.	.....	At Presburg followed by a violent storm. The mineral waters of Buda became warmer than usual. Comorn was almost completely destroyed, and it was resolved to rebuild it further from the Danube.	The Gazette de France, 20 et 27 Mai, 3 et 13 Juin; Ephém. de Mannheim, 1783, p. 141; Cotte; Ziehen, <i>loc. cit.</i>
— 23. 1½ P.M.	Colebrook Dale in England.	An earthquake.	.....	.....	Gentleman's Magazine, vol. liii. p. 442.
— May 5.	Grenoble in France	Ditto	.....	.....	Cotte, <i>loc. cit.</i>
— 12 to 31.	Comorn in Hungary	Nineteen shocks during this period.	.....	The last of these shocks, more violent than that of April 22, threw down the newly-built walls.	Gazette de France, 1 Juillet.
— June 1.	Constantinople	A single shock.	.....	.....	Ditto, 15 Juillet; Cotte.
— 1 to 10.	In the province of Skaptarfiall, Iceland.	Numerous and violent shocks.	.....	Accompanying violent eruptions of Skaptar-Jökul and other volcanoes of Iceland, which began about the end of May, and continued until the following year. The river Skapta disappeared completely, and a new island rose from the sea near the coast. For details see v. Hoff.	Stephensen's account of this eruption, Altona, 1786; Henderson; Penant, Le Nord du Globe, t. i. p. 308; Byriès, Abrégé des Voy. Mod. t. vii. p. 186; Marmier, Hist. d'Islande, p. 355; Gaz. de Fr. 22, 25 Juillet, 8 Août, 2 Déc. &c. Cotte, <i>loc. cit.</i>
— 8	Calabria	More severe shocks. (See Feb. 5.)	.....	.....	.....
— 13.	Godgard in Ost Gothland, Sweden.	Some shocks from E. to W.	.....	An hour before a noise like that of a carriage rolling over pavement was heard. v. Hoff (without quoting any authority) records another earthquake in Ost Gothland on the 15th July. It is very improbable that there were really two.	Gazette de France, 1 Août; Cotte.
— Between 4 and 5 A.M.					

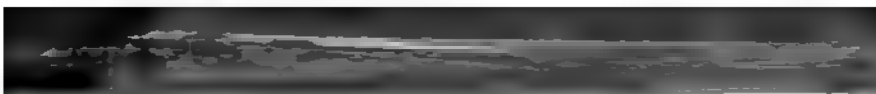
1.	2.	3.	4.	5.	6.
3. June 20 d 22.	Florence	Libratory shocks	Unusual motion of the sea was observed near Naples. From the way in which the date is given, it seems probable that the earthquake at Florence occurred on the 20th, and the agitation of the sea at Naples on the 22nd.		Cotté, <i>loc. cit.</i>
- July 6, 56 or 57 M.	Dijon, Verdun, Scurre, St. Jean-de-Leonc, &c., over a space circumscribed by a line passing through Langres, Châtillon, Aignay-le-Duc & Montbauri; extending to the Rhone and felt at Besançon.	At Dijon two perceptions of the oscillations followed by a slight trembling. Apparent direction N.N.E. to S.S.W. At the three places named next, the clock had struck at the time. Some people believed the motion to be vertical. At Besançon a slight oscillatory but vertical shock was felt at 10 ^h 3 or 4 ^m ; and at 10 ^h 15 ^m two shocks were observed at Lausanne, and three at Bourg and Salins.		At Besançon it appeared as if the air were compressed against the doors and windows. The noise was not subterranean, nor aerial, but like that produced on throwing a handful of grain against a flat surface. The weather was hot and fine, and was not altered. The celebrated mist which obscured almost the whole of Europe and part of Asia this year, was observed here.	Mém. de l'Acad. de Dijon, 1783, p. 26; Mém. de la Soc. de Lausanne, 1783, p. 120; Gaz. de Fr. 22 Juillet; Journ. de Paris, 22 Oct. 1784.
- 18	Calabria	Severe shocks were still felt.			Vivando, 1788, p. 28.
d 19.	20. Tripolis in Syria, and a part of the mountains of Lebanon.	Two shocks, rapidly succeeding one another, and lasting altogether 8 or 10			Preceded by a hollow noise like the roaring of distant waves. The weather before had been very tempestuous, with fogs and violent rain. Masses of rock were shaken down from the

earthquake was felt over a space of twenty or thirty leagues.	details see v. Hoff.		
— 29. Calabria and Messina... 6 A.M.	A violent shock at each of these hours. (See 5th February.)	Four villages were completely ruined	Annual Register, vol. xvi. p. 36.
eg. 9. Lannecaton in Cornwall.	An earthquake		Gentleman's Magazine, vol. lli. p. 708.
— 30. Messina	Another shock. (See 5th February.)	A slight eruption of Vesuvius took place on the 18th.	Cotte; v. Hoff.
Apr. 7. La Rochelle and the en- viron, France.	A slight shock.	Accompanied by subterranean noise.	Gazette de France, 30 Sept.; Cotte.
et. 26. Kapak in Transylva- nia.	Some shocks		Cotte.
ov. 17. Bolsena in the States of the Church.	Ditto		Ditto
— 29. New York, United States P.M.	A rather violent shock.		Gazette de Leyde, 1784, Janv. 23.
— 30. Ditto	Another of less vio- lence.		Annual Register, vol. xvi. p. 60.
— of the Is.	A violent earthquake.	The shocks here were considered to be more de- structive than those at Messina. On the 25th and 29th November falls of portions of moun- tains in Spain took place. (See Parry's me- moir on Earthquakes in the Iberic peninsula, p. 22.) There is no proof of these events be- ing consequent on earthquake shocks.	
bet. 8. Pistoia in Italy	An earthquake shock.	On the 9th a noise like thunder was heard at Cambray (depart. Nord) in France. It was supposed to proceed from a slight earthquake, though no shock seems to have been felt. (Gazette de France, 19 Déc.)	Cotte, loc. cit.
— 14. Aleppo.	A slight vibratory shock.		Volney, Voyages, &c. t. vi. p. 359.
— The Danish island of between Christian near Born- holm.	Three shocks, of which the second was the most severe.		Merc. de France, 7 Fév. 1784; v. Hoff.

1.	2.	3.	4.	5.	6.
3. Dec. In Messina, and in Calabria. Two or three more shocks. In course of a year, and ending of 34.		Two or three more shocks.		Although no shocks are specified in October and November, it is probable that these regions were not during that time altogether still. Houses were thrown down. Humboldt (in his Nouvelle Espagne, t. i. p. 304) mentions terrible subterranean noises, as heard here from the 9th of January to the 12th February, 1784, and which extended as far as Guanaxasto; but he adds that no other phenomenon followed them. Perry thinks however that this passage refers to phenomena connected with those here recorded.	Merc. de France, 31 Janv. 1784. Journ. Encycl. 1 Mai, 1784.
4. Jan. 17. La Rochelle in France. And 9 P.M.		Two shocks at the hours mentioned (v. Hoff, quoting the Journal de Paris, gives but one, namely at 9 P.M.). A vibratory shock		Accompanied by a violent storm at 9 P.M., with thunder, lightning, and hail. Some persons denied the fact of there being an earthquake altogether.	Merc. de Fr. 14 Fév., 20 Mars; Journ. de Paris, 4 Fév.
20. Siebenlehn near Nossen in Saxony, on the northern slope of the Erzgebirge.		Several ditto			Hamburger Correspondent, 1784. Nr. 19.
23. In Hungary. In the suburb Leopold at Vienna.		Some people believed they felt a trembling.			Cotte, Hamburger Correspondent, Nr. 28.
and in Calabria March.		Pretty numerous shocks, of which one (at Terranova) was very severe.		The preceding winter had been unusually severe and long continued both in Europe and America. A thaw of alarming suddenness took place in the middle of March, but afterwards severe cold set in again.	Dolomieu, loc. cit. pp. 50 and 69; Hamburger Correspondent, Nr. 57.
Mar. 6. In some Danish islands.		Several shocks.			Cotte, loc. cit. Tolddo, loc. cit.
19. Udina in Italy.		One shock			Schriften der Berlinischen Gesellschaft naturforschender Freunde. B. 5. S. 490; Cotte.
20. Prague, the circle of Leutenitz, and the circle of Saaz as far as		A very violent shock.		Accompanied by a loud subterranean noise. At Osek a mountain opened, and a little stream came forth which ran for several hours. Several buildings, amongst others a battery at Dera	

in the evening.	the village and a circle of three leagues radius round it being shaken.	Another severe shock.	.....	Preceded by a terrible storm, with lightning and hail.	Merc. de Fr. Mai et Août.
— April 1.	In Calabria. Both here and at Messina fresh shocks seem to have occurred during the month.	.....	.....	.....	Ditto; Gentleman's Magazine, vol. liv. p. 376.
— Five minutes past mid-night to 2½ A.M.	7. Albino, Frescati, and other places near Rome.	Seven violent shocks.	.....	.....	.....
— 20.	Briançon in France.....	A vibratory shock	.....	.....	v. Hoff.
— May 11.	Zailgrotz in Hungary ...	Several shocks.....	.....	A thick vapour arose from a spring at this place.	Cotte.
— 13.	Arequipa. Also the districts of Cumana and Maquiqua, South America.	A terrible shock at Arequipa.	.....	The districts of Cumana and Maquiqua were devastated. Masses of soil were transported to great distances.	Merc. de Fr. 8 Janv. 1785; Journ. Encycl. 1 Fév. 1785.
— June 5.	Caub on the Rhine.	One shock, followed by another at 6 P.M.	.....	A mist preceded the first shock, and a storm followed it on the Rhine.	Hamburger Corresp. Nr. 99.
— Between 12 noon and 1 P.M.	Still more violent at the castle of Gutfels, and the Pfalz.	.....	.....	.....	.....
— On to the end of the month.	Reggio in Calabria	Repeated trembling motion during this period.	.....	.....	Cotte.
— 6.	Carrara	A severe shock	.....	.....	Hamburger Corresp. Nr. 103.
— About 8 P.M.	.....	.....	.....	.....	.....
— 15.	Comorn in Hungary ...	Several shocks.....	.....	.....	Cotte.
— July 8.	Messina	A violent shock	.....	Preceded by a noise like thunder	Hamburger Corresp. Nr. 129.
— 10.	Bagnères de Luchon in the Pyrenees.	Several shocks.....	.....	.....	Palassou, loc. cit.
— 23.	In the Paschalik of Erzerum. Felt at Erzerum itself.	A most destructive earthquake.	.....	The city of Arsingham (Ezinghian), 15 leagues from Erzerum, was ruined, and Soliman Pasha, the new governor, all his suite but eleven, and 5000 other individuals perished beneath the ruins. Perrey, on the authority of the Mercure de France and Journal Encyclopédique, gives the date 19th July.	Hamburger Corresp. Nr. 143, 148, 149, 155; Gazette de Leyde, 14 et 21 Sept.; Merc. de Fr. 25 Sept.; Journ. Encycl. 15 Nov.

1.	2.	3.	4.	5.	6.
4. July 29. Port-au-Prince and Cap-Haïtien (François?) in St. Domingo, and Leogane in Jamaica.		In Jamaica two shocks		A hurricane occurred at the same time, both here and in Florida. Twelve houses were thrown down at the Cape (François?), and much damage was done at the other places.	Hamburger Corresp. Nr. 171; Gaz. de Leyde, 22 Oct.; Suppl. et 3 Nov.; Suppl. Merc. de Fr. 9 et 30 Oct.; Mém. de l'Acad. de Dijon, 1784, p. 78.
30. In Norway		A trembling shock			v. Hoff.
31. Kingston in Jamaica		Two shocks		Accompanied by a noise like thunder. A furious hurricane raged during the whole night.	de l'Acad. de Dijon, loc. cit.
Aug. 7. Comorn in Hungary		Two slight shocks		But little damage was done. On the side of Betharram and Lourde nothing was felt.	Mercure de France, 18 Sept.; Cotte.
10. In the Pyrenees, at St. Marie in the Pays de Soule, and especially at Camon and Ogen.		One shock, apparently in the direction of the chain of the Pyrenees.			Palassou, loc. cit.
14. Langore and Olavsvik in Iceland.		A vibratory shock lasting some minutes, and followed by 7 others of less violence, the eighth after.			Mercure de France, 16 Oct., 27 Nov., 3 et 8 Janv. 1785; Voyage en Islande, loc. cit.; Hamb. Corresp. Nr. 152; Cotte.
15. Ditto		Another shock, succeeded by more during the night.			Ditto.
16. Ditto		Another shock of great violence.		Thirty large farms were ruined by these shocks. Bells rang of themselves.	Ditto.
19. In Calabria Ulteriore		A violent earthquake (the most so in this year). The earth remained in agitation a whole hour.		Clefts opened in the earth	Hamb. Corresp. Nr. 165.
23. At Betsyne near Bages in the Pyrenees, and also, though slightly at Bages itself.		A slight vibration			Palassou, loc. cit.
25. Neumark. ("Does this refer to the Neumark near Zwickau, to that		Ditto			Cotte, loc. cit.



REPORTS
ON
THE STATE OF SCIENCE.

Third Report on the Facts of Earthquake Phenomena (continued).
By ROBERT MALLET, C.E., M.R.I.A.

Catalogue of recorded Earthquakes from 1606 B.C. to A.D. 1850.

[Continued from Report for 1853, p. 212.]

1. ANNO DOMINI.	2. <i>Locality.</i>	3. <i>Direction, duration, and number of shocks.</i>	4. <i>Phenomena connected with the sea.</i>	5. <i>Meteorological and other phenomena.</i>	6. <i>Authority.</i>
1784. Aug. 26.	At St ^e Marie and Oléron in the Pyrenees.	A slight vibration			Palassou, <i>loc. cit.</i> p. 269.
— 27.	The village of Viel, a league quarter of a league from Barèges in the Pyrenees.	A Ditto			Ditto.
— Sept.	Island of Cephalonia.	Many severe shocks.		In Cephalonia much damage was done; but little however in St ^a Maura and at Argos.	Hamb. Corresp. Nr. 176.
Beginning of the month.	Also in St ^a Maura, and at Argos.				
— 5.	Grenoble in France.	One shock			v. Hoff.
— —	Fortress of Rheinfels on the Rhine.	Two shocks		Accompanied by a loud explosion like the report of a cannon.	Mercure de France, 20 Oct.; Cotte.
At night.					
— 12.	Calabria Ultra.	Repeated shocks.	On this day, about 9 A.M., an unusual agitation of the wa- ters of Loch Tay in Scotland was ob- served. The move- ment was from E. to W., lasted a quar- ter of an hour, and was accompanied by noise. The phæno- menon recurred on the five following days at about the		Gazette de France, 5 Nov.; Journ. Encycl. 15 Nov.; Hamb. Corresp. Nr. 171; Biblioth. Brit. t. vi. p. 184-187; Edinburgh Transac- tions, vol. i. p. 200.

9 P.M.	12. Calabria Ultra.....	A severe shock .....	.....	More damage was done. "Dr. Maret, in his account of the following earthquake at Dijon, only admits this shock as real, and rejects the accounts of those on the 12th September" (Perrey quoting Mém. de l'Acad. de Dijon, 1784, p. 79).	Ditto, 6 Nov.
12 ^h 2 or 3 ^m noon.	15. Dijon, Tournus, Châlons, Autun, Chareilles, Besançon, Lons-le-Saulnier, Geneva, and Valence. Also at Grenoble, in the valley of Graisivaudan, at Chambéry, at Bourg-en-Bresse, and at Aix in Savoy.	At Dijon rather a slight shock. The oscillation appeared to be in the direction S.E. to N.W. at most of the places mentioned; at Grenoble it was violent, and from E. to W. It was still more violent in the valley of Graisivaudan, as far as Chambéry at Bourg, and at Aix in Savoy.	.....	The weather at Dijon was calm and fine, and was not immediately altered, but in a few days it became rainy, and continued so (with some snow) for some time. Two peasants on a ladder were thrown down at the bridge of Beauvoisin. At Bourg-en-Bresse the shock was accompanied by a noise like that of a blast of wind, although the atmosphere was quite calm. At this place the barometer suddenly fell three lines, and rose immediately after the shock to its former level.	Mém. de l'Acad. de Dijon, 1784, p. 65; Gaz. de Fr. 2 Nov.; Merc. de Fr. 6 Nov.; Journ de Paris, 28 Oct.
.....	17. Naples	Two shocks .....	.....	On the 24th Vesuvius began to send forth smoke, &c.	Merc. de Fr. 27 Nov.
.....	22. Altamora and some other places in Calabria.	Several shocks.....	.....	.....	Hamb. Corresp. Nr. 193.
Nov. 9.	Briançon	One shock .....	.....	.....	Cotte.
12.	In the bishoprick of Spirea.	Violent shocks.....	.....	A high wall of 7 feet in thickness was thrown down at the castle of Kropsberg.	Merc de Fr. 18 Déc.
13.	Arequipa in Peru	An earthquake.....	.....	.....	Cotte.
29.	Bourlemont, half league from Neufchâteau (depart. Vosges), and at Clefmont (depart. Haute Marne). Also Strasbourg, Bâle, Berne, and all the southern part of Alsace; and in Dan-	At Bourlemont a violent shock of a minute's duration. At Strasbourg, &c. in Alsace, several shocks, lasting 4 or 5 secs., and in the direction S.W. to N.E.	.....	The barometer was observed to fall below "stormy," not only in the region where the earthquake was experienced, but also at Paris where nothing was felt.	Mém. de l'Acad. de Dijon, 1789, p. 79; Merc. de Fr. 18 Déc. 1 Janv. 1785; Éphém. de Mannheim, 1784, p. 458; Gazette de Leyde, 21 Déc.; v. Hoff.
10 ^h 10 ^m .....	.....	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
1. Dec. 3. In the valley of Grasse, P.M.	plany and Savoy, at Geneva, in the Canton de Vaud, and in Germany, over a space of more than 10 leagues.	Several shocks from N.E. to S.E.		Preceded by a subterranean noise.	Mém. de l'Acad. de Dijon, 1784, p. 79; Cotte.
— 4. Pragnè. 4 and 5	from Grecolle to Chambéry, and in the mountains separating this valley from La Maurienne. Also at Parreux and Albivand.	Slight shocks from E. to W.S.W.			Éphém. de Mannheim, 1784, p. 680.
— 5. Neufchâteau, Roureux, Noncourt, and Bour-leuont (department Vosges).		A violent shock		Some walls and a house were thrown down. A violent wind arose at the time of the earthquake, and blew for thirty-six hours. The barometer fell six lines at Paris the night before. (May not this allude to the event of the 29th Nov.?)	A Journ. de Paris, 24 Déc.
— 6. On the English coast.		Several shocks		Accompanied by a low noise. For some days burning vapours had been observed rising from the earth, beneath which there were deposits of coal. Very probably this is but the same event with that before given as occurring on the 9th Nov.	Cotte.
— 9. Briançon (department Hautes-Alpes).		A rather severe shock			Mém. de l'Acad. de Dijon, 1784, p. 79.
— 21. Calabria Ultra		Shocks of great violence again, lasting some minutes.			Gar. de Leyde, 1785, Nr. 11, Suppl.; Journ. Encycl. 1 Mars 1785.
— 28. Around Vesuvius, and as far as Naples.		Vibratory shocks.		Accompanying an eruption of the upper crater of Vesuvius, which lasted until the following February, but did little damage.	Hamb. Corresp. 1785, Nr. 8 u. Nr. 44.
— Furstenau in the county of Erbsach, between and		Two violent shocks, lasting 1 min. each.			Mém. de l'Acad. de Dijon, 1785, Nr. 8 u. Nr. 44.

4 P.M.	thia.	Several slight shocks.	.....	Cotte gives the date 28th January	Merc. de Fr. 5 Mars; Cotte.
Night between 23 and 24.	In various Danish islands, particularly in Sœbye.	Two more shocks ...	.....	The air was calm, and it rained heavily	Merc. de Fr. 5 Mars; Éphem. de Mannheim, 1785, p. 580; Hamb. Corresp. Nr. 30.
— 31. At midnight.	Klagenfurth again	More violent oscillations.	.....	Fresh damage done	Merc. de Fr. 26 Mars; Journ. Encycl. 15 Avril; Hamb. Corresp. Nr. 44.
— Feb. 4.	In Calabria	Another earthquake...	.....	Buildings were again thrown down	Éphem. de Mannheim, 1785, p. 581; Hamb. Corresp. Nr. 52.
— 13.	Ditto	A slight vibration ...	.....	The Hamburger Correspondent gives the date 20th February.	Éphem. de Mannheim, 1785, p. 581; Hamb. Corresp. Nr. 51.
— 19. Between 7 and 8 A.M.	Lisbon	A violent shock at Mosdock, lasting two minutes, followed in an hour by a second of equal violence and duration, and between 7 and 8 P.M. by a feeble one. At Astracan three violent shocks.	The water of the Terek was strongly agitated.	The first shock was accompanied by a subterranean noise like thunder. The second threw down the sentinels. The Éphem. de Mannheim gives the date 24th February for the shocks at Astracan.	Hamb. Corresp. Nr. 70; Gaz. de Leyde, Nr. 37; Merc. de Fr.; Éphem. de Mannheim, p. 582.
— 24. 1 A.M.	Mosdock again	Another shock, as violent as either of the first two.	.....	.....	Ditto.
— 26.	Island of St. Thomas in the West Indies.	An earthquake .....	.....	Probably the same earthquake with one mentioned (without date) in a letter to the Hamb. Corresp. Nr. 56, dated London, 29th March, as having been felt in Barbadoes, Grenada, and Trinidad.	Hamb. Corresp. 1785. Nr. 99.
— End of the month.	Patras. Also in the island of Zante.	A violent and destructive earthquake.	.....	Vesuvius was in violent eruption during the greater part of this year.	Ditto, Nr. 71; Gaz. de Leyde, Nr. 35; v. Hoff.
— Mar. 17.	Messina	Another shock .....	.....	The few houses that remained standing before this, were thrown down. On the 13th of this month a sort of small volcanic eruption took	Merc. de Fr. 7 Mai; Journ. Encycl. 1 Juin, 1785; Gaz. de Fr. 13 Janv. 1787; Hamb. Corresp. Nr. 70.

1.	2.	3.	4.	5.	6.
1785. April 2. 4 ^h 20 ^m A.M.	Nordenstadt near Darmstadt. Also felt at Mayence, and still more at Schelestadt.	A severe shock		place in the river Majuri (province of Salerno); on the 11th the river Tevot in Scotland dried up suddenly, and remained dry for two hours (the weather being very cold, and the stream covered with ice), and on the 31st at Comotace in Bohemia there occurred a great fall of a mass of earth. There is no proof, however, of any of these phenomena having been attendant on earthquakes.	Merc. de Fr. 30 Avril et 7 Mai.
— — — — —	Eglisan in the canton of Zurich.	A vibratory shock			Hamb. Corresp. Nr. 60; Éphém. de Mannheim, p. 586.
— — — — —	Mayence	Several shocks			Hamb. Corresp. Nr. 58.
Night between 2 and 3.				Probably this and the last two events occurred nearly, if not exactly, at the same time.	Mémorial de Chron. t. ii. p. 932.
— — — — —	10. Mexico, and several other districts of New Spain.	Violent earthquake shocks.			Hamb. Corresp. Nr. 82; Cotte.
— — — — —	20. Fiume in Italy.	Several shocks			Hamb. Corresp. Nr. 96.
— — — — —	21. Mont-Dauphin in Dauphiny.	One shock			Merc. de Fr. 4 Juin.
— — — — —	26. Smyrna	Two shocks			Hamb. Corresp. Nr. 92.
5 and 9 P.M.					Ditto; Merc. de Fr. 18 Juin.
— — — — —	29. Mont-Dauphin again	Two consecutive shocks lasting five to six seconds.			
11 A.M.					
— May 5.	Grenada in Spain	An earthquake of two minutes' duration.			
Midnight.		Several shocks			
— — — — —	13. Naples				
About half an hour after midnight.					
— — — — —	20. Fiume in the Gulf of Venice.				
				Preceded by a subterranean noise. In all probability the same event with that recorded on	Gentleman's Magazine, vol. lv. n. 663

..... At Vevay a piece of ground sank during this month, and many houses upon it. No shock mentioned. (Hamb. Corresp. Nr. 102.)	..... The shocks were also felt on board the ships in the neighbourhood of these isles.	..... A severe earthquake.. The shocks continued in Calabria, according to letters of this date from Naples. The most violent shock ever known up to that time in Antigua.	Velletri in Italy Calabria	June 5. June 21. (Before this date.)
In Tortola the earthquake made great clefts in the rocks, and separated completely a part of the island, forming a new island.	The shocks were also felt on board the ships in the neighbourhood of these isles.	The most violent shock ever known up to that time in Antigua.	Island of Antigua. Also in the island of St. Christopher, and Tortola.	July 11. 3 A.M.
Two churches were thrown down.....	.....	An earthquake	Santa Fé de Bogota ...	12. 8 A.M.
.....	.....	More shocks, according to letters from Naples of the dates given.	In Calabria	and 20. (At periods before these dates).
During rain. The evening before, Dr. König suspected the probability of shocks from observing some considerable magnetic perturbations.	.....	An earthquake	Clausemberg in the basin of the Danube.	18.
.....	.....	A slight shock, ending by an oscillation from S. to N.	Padua	19. About 11 ^h 20 ^m P.M.
.....	.....	Several shocks. Another, but slighter, at 6 A.M.	In Upper Austria, at Steierregg, St. Georgen, Pulgarn, and other places.	23. or 25, 1 A.M.
Followed by heavy falls of rain, which caused inundations of the Adige and other rivers. The Éphém. de Mannheim (p. 592) gives the date 2nd August.	.....	A rather violent shock.	Triente in Italy. Also at Padua.	26.
It was remarked that this city experienced earthquakes every seventeen or eighteen years.	.....	A violent earthquake.	Port-au-Prince in St. Domingo.	29.
Some houses were thrown down at Ratibor and Pless. Part of the river Biala disappeared. At Sorau the tower of the Rathhaus was so	.....	Several shocks A severe vibratory shock. It was slight and lasted fifteen	Payo in Spain In Moravia and Silesia. Besides the places mentioned in the next	Aug. 6. 22. 6½ or 6¾ A.M.

1.	2.	3.	4.	5.	6.
	column, Soran, Mostek, Fridelk, and Skotzan are mentioned.	seconds at Cracow, Vatur-Lipova, Krušowika, Morawika, and Bolecho		shaken that the bell was struck, and sounded. The Éphém. de Mannheim gives the date 24th August, and attributes the earthquake to inundations of the Oder having undermined the ground. On this day a piece of ground sank at Jarmolin near Sanock in Poland. Irregularities of the magnetic needle were observed in Germany, both before, on, and after this day.	154; Gazette de Leyde, Nr. 66.
3. Aug. 22. In several parts of Italy	Several shocks			Cotte.	
— 29. Smyrna	A slight earthquake			v. Hoff.	
— Sept.	Briançon in Dauphny	At Briançon 2 shocks	On the 6th an extraordinary rising of the sea took place at La Rochelle. No shock mentioned. (Éphém. de Mannheim, p. 723.)	No damage done. At Sasa in Piedmont two houses fell. Some days before, the atmosphere was very hot, and full of vapours. This was the third earthquake this year at Briançon.	Merc. de Fr. 1 et 8 Oct.; Gazette de Leyde, Nr. 81, Suppl.; Hamb. Corresp. Nr. 162; v. Hoff.
— 1. Oct.	Also at Grenoble, and very severely at Briançon.	Grenoble their direction was N. to S.			
— 22. Cracow in Poland	Three shocks from W. to E.				Merc. de Fr. 17 Déc.; v. Hoff.
— 1. Rome	Two shocks, followed by a third of more violence at 7 A.M.				Hamb. Corresp. Nr. 171.
— At Linz, and at Gailenkirchen and other places in the neighbourhood.	Three rather strong vibrations.			The walls were cracked	Ditto.
— 2. Rome, and still more at Tivoli, Frascati, Marino, Castel-Giandolfo, Spoleto, Rieti, and Terni, to the distance of sixty miles from Rome, upon the side of the Apennines.	Two or three violent shocks.			At the same time some drops of rain fell for a few minutes.	Ditto; Merc. de Fr. 28 Oct. et 10 Déc.; Journ. Encycl. 1 et 15 Déc.; Éphém. de Mannheim, p. 158.
— 3. Ditto. Also (on same day but hour not stated)	Three or four shocks			On the same day a spot of ground of 24 feet in diameter sank in the district Kalna at Oliva in	

11. Terni. Also on this day at Venice again.	was from below upwards. They were more violent, and extended further than the former. At Norcia they were followed by others at 4° 30", scarcely perceptible at Rome.	Processions were instituted in order to the cessation of these shocks.	Ditto.
13. Rome	An instantaneous and scarcely perceptible shock.		Ditto.
14. Terni and Tivoli	More shocks	At Pie-di-Lugro (probably the centre of this disturbance) several small fumaroles opened, from which there came forth smoke and an odour of sulphur.	Ditto.
15. Terni	Twelve shocks in the space of four hours.	Ended with an explosion. The atmosphere was hot, and a fire-ball was observed.	Hamb. Corresp. Nr. 176-178.
Nov. 5. Terni again	In Thuringia; felt at Kahla, Jena, Weimar, Burgel, and as far as Nordhausen.		Cette.
27. Venice	Several shocks.		Ephém. de Mannheim, p. 158, and Append. p. 80; Gaz. de Fr. 3 Fév. 1786.
Nov. 5. Terni again	Another shock.		Hamb. Corresp. Nr. 208.
9. Tangiers	A rather violent earthquake.		Ephém. de Mannheim, and Gaz. de Fr. loc. cit.
12. Terni again	Another shock	It rained in the evening.	Ephém. de Mannheim, 1785, p. 556.
Rome	A slight shock.		Hamb. Corresp. 1786, Nr. 3.
16. Spidsberg in Norway	An earthquake shock.	Rain during the following evening and night	Ephém. de Mannheim, p. 185, and App. p. 80; Gaz. de Fr. 3 Fév. 1786.
22. Lisbon	A slight earthquake.		
25. Terni again	Several more shocks.		

1.	2.	3.	4.	5.	6.
85 Nov. 24. Trem again About sun- set.	...	Several more shocks.	...	Rain during the day	Éphém. de Mannheim, p. 158, and ApPEND. p. 80; Gaz. de Fr. 3 Fév. 1786. Ditto
— Dec. 4. Ditto	...	Ditto	...	Ran before, during, and after the shocks	Ditto
At night.	Cotte; Hamb. Corresp. 1786, Nr. 2.
8 Dec. 10. Trem again and Run in A rather severe shock.
links the seth most robably the unrecorded.
— 16. Trem again. Also per- Numerous shocks in From 8 p.m. ceptible at Tadiu. this space of time.	Éphém. de Mannheim, and Gaz. de Fr. loc. cit.
to 3 p.m. the following day.	It rained at this place almost every day during Ditto. the month.	...
— 20 Trem again	...	More shocks	...	Accompanying a new volcanic eruption	Gaz. de Fr. 24 Fév. 1786, quoting a letter from Copenhagen of the 30th January.
— Towards Iceland	...	Many earthquake shocks.	...	...	Abh. der Bohmischen Gesellschaft der Wissenschaften, 1785, Abth. 1. S. 107.
— 6. Trem again	...	An earthquake	...	...	S. Hoff.
— 2 Baltimore, United States An earthquake	It rained almost the whole day	Éphém. de Mannheim, 1786, p. 496; Gaz. de Fr. 3 Mars.
786. Jan. 1. Trem again	...	Another vibration	...	...	Éphém. de Mannheim, 1786, p. 572; Cotte.
— 2 Baltimore and (also) An earthquake shock	Éphém. de Mannheim, p. 569.
73 15 th A.M. bridge, United States	...	Ditto	...	...	Ditto, p. 496; Gazette de France, 3 Mars.
— 3. Trem	Ditto.
— 6. Rome
9 th 30 ^m p.m.
— 13. (tribble) eight posts from Rather smart shocks.
— 14. A.M. Trem, in the Romagna.
— 15. About noon	...	A slight shock.	...	This month, like the preceding, was very rainy, Ditto. especially towards the end.	...
— Szalmar in Hungary	...	Some slight shocks	...	...	Gazette de France, 24 Mars.
burnt given

8 P.M. — Feb. 5. Corfu	An earthquake	According to the Mercure de France (13 Mai), this earthquake ruined a great part of a town and caused the death of 120 persons. No date (as to month or day) is given, but it obviously refers to this event.	Gentleman's Magazine, vol. lvi. p. 262.
— 12. Reate (now Rieti) in the 5 ^h 30 ^m A.M. Romagna. Also on this day (hour not given) at Terni; and about this time at Gubbio.	A vibration at Reate. At Terni a very se- vere shock; and at Gubbio every day about this time three or four shocks were experienced. How many on this day is not said.		Éphém. de Mannheim, p. 498; Ga- zette de France, 24 Mars.
— 13. Albstadt (Swabia), Midnight. Schreiberseisen and Diversdorf.	Several shocks.....		Gazette de France, 24 Mars, quoting the "rubrique" of Hamburg of the 24th February; Cotte.
— 15. Clausenburg in Transyl- vania.	A violent earthquake	Four churches were thrown down, and much damage was done besides.	Hamb. Corresp. Nr. 46; Gazette de France, 28 Mars.
— 24. Terni again	A slight vibration	It rained on the following days.....	Éphém. de Mannheim, p. 499.
— 27. Very widely extended, 1 A.M. being felt all over Up- per Silesia, Poland, Hungary, Moravia, and Bohemia; principally along a line drawn from Brünn to Cracow (i. e. 35 geographical miles in a S.W. to N.E. direction). On this line it was felt at Brünn, Keltzsch, Schwechwitz, Schwa- nowitz, Misteck, Frie- deck, Teschen, the Polish Ostrau, Neu- bel, Bielitz, at Tribau, and at Cracow. Also,	Violent but not very destructive shocks. At Keltzsch the earth was agitated for a quarter of an hour. At Schwanowitz two shocks were felt at the hours mention- ed, the second (at 4 A.M.) being the more violent. At Bielitz, two hours before, a slighter shock had been felt, and another similar one at 8 P.M. the evening before. At Okolicsma 3 shocks	At Schwechwitz a cleft opened in a church. At Bielitz subterranean thunder was heard. At Altheida a little river disappeared suddenly. In the mines of Tarnowitz and Wieliczka nothing was felt. The weather was hot, and the air calm, but in Hungary a violent storm succeeded the shock.	Hamb. Corresp. 1786, Nrs. 41, 43; Gazette de France, 31 Mars, 14 et 18 Avril; Éphém. de Mannheim, 1786, p. 570.
4 A.M. 12 ^h midnight and 4 A.M.			
4 ^h 15 ^m 4 ^h 20 ^m			

1.	2.	3.	4.	5.	6.
4 th 15 th 4 A.M.	off this line, in Hungary at Okoltsna, Smeran, and Potur-nya; and in Bohemia at Kongsgraz	were perceived. The general direction was from W. to E.			
6. Mar. 4	Falkenberg in the province of Halland in Sweden.	Several severe shocks		During a season of intense cold	Gazette de France, 28 Avril; Cotte.
— 3	vice of Halland in Sweden.			Part of Melazzo was very much ruined	Hamb. Corresp. Nrs. 65, 61.
— 9	In Sicily, at Patù and the district around S. Pietro, S. Tindaro, Melazzo, and Messina.	An earthquake			
— 10	In the Palmarie and Voigtland, extending from Nolas to Lobenstein.	Vibratory shocks			Gazette de France, 7 Avril; Éphém. de Mannheim, p. 570; Cotte.
— 24	In Arnes-Syssel, lee-An earthquake				Hamb. Corresp. Nr. 84.
nd earlier	land.			These shocks are very probably the same with the following.	Cotte.
— 28	Bonn on the Rhine	Two shocks at these hours.			
— 28	Bonn and the neighbourhood	Several shocks			Gazette de France, 21 Avril.
— April, Milan, Liscate, and the Ditto				At Liscate some old houses were thrown down.	Hamb. Corresp. Nr. 67; Éphém. de Mannheim, p. 318; Gaz. de Fr. 9 Mai.
— 7	Padua and Bergamo. At Padua a slight shock from N. to S. It was very severe at Bergamo. At Crema the shock was slight, but stronger at Placenza. It seems doubtful whether there was but one shock varying in intensity at the different places, or				Ditto; Hamb. Corresp. Nr. 69.
Hour not given					

— 13. Milan	A trembling .....	.....	.....	Corresp. Nr. 79.
— 22. Bonn, and the adjacent 8½, 10, and some minutes past 11 P.M.	Several shocks.....	.....	Cotte gives the date 21st April.....	Cotte. Gazette de France, 16 Mai; Cotte.
— May 23. Terni in the Romagna Between 1 and 2 P.M.	Another slight vibra- tion.	.....	.....	Ephém. de Mannheim, pp. 503-509.
— 30. Ditto, extending as far 1 A.M. and 9 P.M.	More shocks .....	.....	At Rome the shocks were perceived by everyone	Ditto.
— June 1. In Iceland	A shock unproductive of damage.	Felt by Admiral Lö- wenörn on board his vessel in the harbour of Raikianess.	.....	Herttha von Berghaus, B. 3. S. 703.
— 4. Rome and Terni	At Rome a slight undulatory shock, more severe in the environs of Terni.	.....	Followed by rain	Éphém. de Mannheim, loc. cit.
— 10 A.M.	Another vibration .....	.....	Ditto	Ditto.
— 13. Spoleto and all the plain, between Terni and the foot of the Apennines.	More shocks .....	.....	Some damage was done at San-Gemini	Ditto; Hamb. Corresp. Nr. 105.
— 14. Terni and San-Gemini...	An earthquake.....	.....	.....	Thomson's Annals of Philosophy, vol. viii. p. 366.
— 16. Whitehaven, the south of Scotland, the Isle of Man, and at Dublin.	Several shocks .....	.....	.....	Éphém. de Mannheim, loc. cit.; Hamb. Corresp. Nr. 101.
— 30. Rome, Sabina, Monte- roborde, and other places in the States of the Church.	Shocks, continuing for several days after.	.....	It rained at 6 P.M.	Gazette de France, 12 Sept.; Éphém. de Mannheim, p. 87.
— July 8. Buda, Comorn, &c., from About 6 A.M.	One shock .....	.....	.....	Cotte.
— 10. St. Goar on the Rhine...	Ditto .....	.....	.....	Ditto.
— 22. Ofen and Comorn in Hungary.	A shock of two se- conds' duration.	.....	The atmosphere was hot and calm	Hamb. Corresp. Nr. 120.
— 24. Bonn .....	.....	.....	.....	.....
12½ 8 ^m midn ^t.	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
July 30. 6 ^m A.M.	At Flekkertord, and in the western part of Norway.	Three shocks during 21 seconds.			Gazette de France, 26 Sept.; Éphém. de Mannheim, p. 404; Cotte.
— P.M.	Rome, Ricci, Aquila, and Naples.	A shock, much more severe at Ricci and Aquila than at Rome.		The weather was lowering all day	Éphém. de Mannheim, pp. 503-509; Cotte.
— 31. A.M.	Egna, 7 (Norwegian) miles to the west of Stadberg in Norway.	Another earthquake—shock.			Gazette de France, 26 Sept.; Éphém. de Mannheim, p. 404.
— Aug. 1. 8.	Aquila again. The centre of the shocks appeared to be at Lucoli.	Forty shocks during this period. On the 22nd of September they had not ceased at Aquila.		At Lucoli a noise was heard like boiling under the earth.	Hamb. Corresp. Nro. 143, 151, 163.
— 5. A.M.	London.	A slight earthquake.			Ditto, Nro. 148.
— 11. A.M.	Whitelaven, Laurester, Cartmell, Newcastleshire, Newcastleshire, Glasgow, the Isle of Man, and at Dublin.	Whitelaven several shocks were felt, lasting three to five seconds. Supposed direction = S.E. to N.W. At Newcastle two shocks were felt, with an interval of three or four seconds.		Preceded by a rumbling noise. The weather close and sultry. Barometer = 29 inches. Several buildings, chimneys, &c. were thrown down. Some people also were thrown off their feet, and birds from their perches. At some places violent rain succeeded the shock. The Annual Register gives the date 1st August, but the discrepancy manifestly arises merely from difference of style. The Hamb. Corresp. (Nro. 138, 146) records an earthquake with precisely the same details as this, on the 14th as felt at Cockermouth, Whitehaven, Workington, Maryport, Kerwick, Carlisle, Kendal, and slightly in Aberdeen. The event seems certainly the same as that here recorded.	Annual Register, vol. xix. p. 38; Gazette de France, 4 Sept.; Phil. Trans. vol. lxxvii. p. 35.
— 19. A.M.	Carthage in Spain.	One shock.			Cotte.
— 22. A.M.	Christiansdatt in Norway. (According to Kellian, Christiansd.)	Some slight shocks.			Gazette de France, 6 Oct.; Cotte; v. Hoff.
— In Upper Silesia and Moravia.		Vibratory shocks.			v. Hoff.
— 25. In the Markgrate of		A trembling shock.			Hamb. Corresp. Nro. 149.

and 14. — 22. 11 ^h 30 ^m P.M. — Nov. 1. At night.	Rome and Terni	A slight shock at Rome, more perceptible at Terni. Several shocks .....	.....	so that a pestilential smell came forth.	Nov.; Cotte. Éphém. de Mannheim, p. 507.
— 18. 10 ^h 20 ^m A.M. — 20. Between 3 and 4 A.M. — 25. 5 and 11 A.M.	La Rochelle in France... Bâle..... Rome and Terni	A slight shock..... Two slight shocks ... At Rome slight shocks, more perceptible at Terni.	.....	It rained on the following days. From the 31st October to the 6th November Vesuvius was in eruption.	Ditto, 1782 (?), p. 362. Hamb. Corresp. Nr. 194; Merian.
— 29. 4 P.M. — Dec. 2. 4 ^h 56 ^m P.M.	Cambridge, United States. Aix in Provence	Another earthquake shock. One shock .....	.....	v. Hoff merely mentions a shock at Rome on the 24th.	Éphém. de Mannheim, p. 507. Ditto, p. 590.
— 3. 4 ^h 56 ^m P.M.	In Silesia, at Breslau, Brieg, Neisse, Lob-schütz, Ratibor, Rams-lau, Cracow, and other places in Poland, Hungary, and Galicia.	Several shocks. At Tarnowitz and some other places there were three, from the S.W.	.....	At Zyllo, in the county of Zips, bells sounded of themselves. At Tarnowitz some houses were injured. The air was calm. The disturbance was very strongly felt in the Carpathian Mountains. At the beginning of this month a cleft appeared in a mountain near Semlin, from which torrents of water came. No shock mentioned.	Cotte. Gazette de France, 9, 12, 19 et 26 Janv. 1787; Cotte; Hamb. Corresp. Nrs. 199, 201.
— 24. 7 ^h 30 ^m A.M. — 25. 2 A.M.	Rimini	Several shocks.....	.....	Most of the houses were injured	Éphém. de Mannheim, p. 510; Gaz. de Fr.
	Padua, Florence, Venice, Ferrara, Mantua, Pienza, Bologna, and especially at Rimini.	At Padua a very severe shock from N. to S. It was as violent at Florence, where another similar one was felt at 5 A.M. At Rimini the most violent shocks were felt, and they recurred here at intervals until the following February.	.....	At Rimini there seems to have been thunder and lightning. Snow fell very thickly there. Many buildings were thrown down at this place.	Éphém. de Mannheim, p. 510; Gaz. de Fr. 19, 26 Janv., 2 Fév. 16 Mars, et 10 Avril, 1787; Hamb. Corresp. 1787, Nr. 8, 9, 18; Cotte.

1.	2.	3.	4.	5.	6.
46. About his year.	Island of Java, particu- larly in the district of Batav.	An earthquake which lasted four months.		Great clefts opened in the earth, from which sul- phurous vapours came out. In other places the earth sank, and produced chasms, into one of which the river Dotog-Bach flowed, and in future followed a subterranean channel from this place. The village of Djampang was swallowed up, with eighty-eight of its inha- bitants, who had not time for escape.	Horsfield, Batav. Trans. vol. viii. p. 141; Lyell's Geology.
47. Jan. 5.	Edsburg in Norway	Scarcely perceptible shocks at these hours.			Ephém. de Mannheim, 1788, p. 394.
— — — — —	6. Camosa (or Campsie)	A pretty smart shock		No damage done. A pair of horses attached to a carrage stopped suddenly at the moment of the shock.	Hamb. Corresp. 1787, Nr. 22; Gaz. de Fr. 9 Fév.
— — — — —	10 ⁰ and Strathblane, ten miles north of Glas- gow.	An earthquake		Did most damage at S. Marino. During the whole of this month Vearvius was more or less in a state of eruption. On the 25th the river Teviot in Scotland again (see 11th March, 1785) dried up suddenly, and remained dry for four hours; the water afterwards return- ing, and flowing as usual. The weather was mild.	Hamb. Corresp. 1787, Nr. 21, 23; Gaz. de Fr. 13 Fév.
— Feb. 25. A.M.	Cambridge, United States.	A slight vibration, not remarkable.			Ephém. de Mannheim, 1787, p. 350.
— — — — —	Rimini in Italy	The shocks continued here during this month.			Gazette de France, 16 Mars, 10 Avril
— March 3.	Florence, Rimini, Padua, and Venice.	Several shocks.			Hamb. Corresp. Nr. 48; v. Hoff.
— — — — —	Acapulco	A violent earthquake.		The city was ruined	Dupetit-Thouart, loc. cit. t. ii. p. 213.
			The sea retired as far as some rocks lying in the middle of the bay. The galeon of the Philippine Isles, which was moored in 10 fathom water, found but 4 fathoms		

24 Between 7 and 8 P.M. April 17. Terni again	Radstadt, Forstan, <i>Flachau</i> , and St. Martin in the Salzburg Alps.	An earthquake .....	.....	.....	Fr. 15 Mai. Hamb. Corresp. Nr. 58.
18. In the morning.	In Mexico, extending from San Luigi de Potosi to Oaxaca, and from Vera-Cruz to Acapulco and Valladolid.	A slight shock.....	.....	.....	Éphém. de Mannheim, p. 224.
29 and 30.	Messina	Earthquake shocks from the S.E. At the city of Mexico the earth was in almost continual agitation for 24 hours.	At Acapulco the sea retreated far from the shore, and then returned high above its former level. From this circumstance it seems probable that the event of the 14th March has either been confirmed with, or was the same as this.	The city of Oaxaca was most injured	Hamb. Corresp. Nr. 137, Beil.
May 6.	In Puglia and the course of Abruzzo.	Two violent vibratory shocks.	.....	.....	Gazette de France, 5 Juin; Cotte.
May 6.	Messina and Naples	Several shocks .....	.....	.....	Gazette de France, 8 Juin.
13.	Ditto	A very severe shock at Messina. Both this and the following were more violent than those of the 29th and 30th April.	.....	.....	Hamb. Corresp. Nr. 95.
July 6. In the morning.	Penrith, Threlkeld, and Keswick in Cumberland.	Another shock .....	.....	During this month a cleft opened in the Heuberg near Rebshausen. No shock mentioned (v. Hoff). Some masses of rock were detached by the shock.	Ditto. Gazette de France, 17 Août; Cotte.
12.	Near Vichely in the county of Semplin, Hungary.	One shock .....	.....	Two mountains were suddenly levelled. No earthquake is mentioned, and the phenomenon may have been nothing more than a great landslip.	Gazette de France, 3 Août.

1.	2.	3.	4.	5.	6.
87. July 16. n the morning, and in the afternoon.	Ferrara.....	Two shocks at these two periods of the day. Both were slight.			Secrétariat de France, 24 Août; République de Mannheim, p. 224.
17. 30 th P.M.	Braga in the province of Minho, Portugal.	A rather violent shock.			A part of the mountain of Lemos d'Ordre in the vicinity of Braga, 25 Sept. at 8 A.M. on this occasion, and a chain of 80 peaks in the middle of June, and on this day the disturbance was most considerable at Braga.
18.	Around Venivius	Some slight shocks.			Accompanying an eruption of the volcano. Both Venivius and Venivius became active about the middle of June, and on this day the disturbance was most considerable at Braga.
21. St. Pierre in Martinique.		A single shock.			Accompanied by a loud noise. Some houses were thrown down.
26. 15 th L.M.	Ferrara again	A violent shock.			Accompanied by a loud noise. Some houses were thrown down.
Aug. 4. In the country near Ferrara.		Some shocks as severe as the last.			Accompanied by a loud noise. Some houses were thrown down.
14. Terni again		A slight shock.			Accompanied by a loud noise. Some houses were thrown down.
26. Peseuberg		One shock.			Accompanied by a loud noise. Some houses were thrown down.
28. Stuttgart, Munich, Augsburg, Landshut, Ingolstadt, Pappenheim, Ansbach, Ems, Dillingen, and Ratisbon. Also at Zurich and Biele.		At Stuttgart 2 shocks, each of 7 or 8 seconds. They were not so severe here as in the basin of the Danube. At Innsbruck the direction was S.W. to N.E. At Munich and Ratisbon also two distinct shocks were felt. At Biele but one shock was felt.			Accompanied by a loud noise. Some houses were thrown down.
15 (or, so, according to r. Hoff, 55) minutes after midnight of the 27th.					Accompanied by a loud noise. Some houses were thrown down.

-- Sept. 4. The city of Mainz.....An earthquake of 1934.

5 A.M.	25. Rome	coming from S.W. Scarcely perceptible shocks at these two hours.	.....	.....	The Hamb. Corresp. gives the date 26th Sept. 1787. Hamb. Corresp. Nr. 169.
0 ^h 15 ^m A.M. and 2 P.M.	Oct. Before the 1st and 21st.	Jamaica, especially at Kingston and Port-Royal.	.....	.....	Hamb. Corresp. 1788, Nr. 13 u. 14.
4 A.M.	23. Island of St. Thomas	An earthquake, consisting of three feeble shocks.	.....	.....	Ditto, 1788, Nr. 18.
2 ^h 20 ^m P.M.	27. Montego Bay in Jamaica	Lasted ten or twelve seconds. The earth undulated slightly for some time afterwards.	.....	.....	Annual Register, vol. xxxi. p. 3.
—	Sienna	An earthquake in the course of the month.	.....	.....	Pilla quotes Soldani.
—	Nov. 3 and 4.	In the district of the Main and Neckar, at Gräfenhausen in the Black Forest, Decken-heim, Heidelberg, Mannheim, Darmstadt, Frankfurt and Hanau.	.....	.....	Hamb. Corresp. 1787, Nr. 181 u. 183; Gazette de Leyde, No. 92; Cotte; Époque, 5 Août, 1846; Gaz. de Fr. 20 Nov.; Éphém. de Mannheim, 1787 (?), p. 12.

1.	2.	3.	4.	5.	6.
87. Nov. 30. After sunset.	Terni again	Now, the motion was felt at 3 and 6 A.M. on the 4th. At the same hours two shocks were felt at Kleinumstadt, from E. to W. At Manahem the direction of both wind and shocks was N.N.W. to S.S.E.			
— Dec. 1st between and 2.	Padua	A slight vibration			
— — — — —	Padua	Slight shocks			
— — — — —	8. Hall in the Tyrol	A slight earthquake. ..			
— — — — —	Island of Zante	An undulatory shock, coming from the west.			
— — — — —	Poppi (or Pappi) in Tuscany, and the environs.	Two severe shocks ..			
— — — — —	Rimini	A rather violent shock.			
— — — — —	The Azores	A violent earthquake.	The ocean inundated the country, and several small islands rose from the bottom of the sea, but soon after disappeared again.		
— — — — —	Tabriz in Persia	An earthquake.			
— — — — —	Mar. 2. Geneva	Two slight shocks ..			
— — — — —	3. Naples. Not felt at the foot of Vesuvius itself.	A slight shock.			

Journal de Marseille, 1787, p. 420.

Accompanied by subterranean noise. From the 15th to the 24th of this month Vesuvius and Etna were simultaneously in eruption.

The Hamb. Correspond. (1788, Nr. 41. Bell.) reports an earthquake at Zante on the 20th of January, 1788. The date is in all probability a mistake, and the earthquake the same with that time reported.

Some damage was done.

Much damage done.

Sullivan's Journal, vol. xxvii, p. 351. L'Institut, 29 Sept. 1842; quoting a MS. Journal of G. Ant. Deluc. Gazette de France, 1 Juillet.

During the eruption of Vesuvius, which had continued almost constantly since the middle of 1787.

way. The Hamb. Cor- resp. says in various parishes of this diocese.	A vibratory shock	On the 10th May a piece of land sank with a terrible noise at Sunkenzoff in Bavaria. No shock mentioned. (Cotte.)	Merian quotes d'Annone's and Huber's Meteorol. Registers. Éphém. de Mannheim, p. 326.
30. ——— 31. ———	Ditto	On the 14th June the road from Bristow to Milton (in England) sank to the extent of 9 feet along a space of 30 wersts (?). Gaz. de Fr. 30 Juillet. No shock is mentioned.	Mercure de France, 2 Août.
June. Middle of the month.	Several shocks	On the 17th of July the medicinal spring at Munzingen in Baden rose to an extraordinary height, a phenomenon also observed there on the day of the great earthquake of Lisbon in 1755. No shock mentioned. (Hamb. Corresp. Nr. 127.)	Thomson's Annals of Philosophy, vol. viii. p. 367.
July 8.	A shock of earthquake	The wind was very stormy both before and after the shock.	Gazette de France, 26 Sept.; Cotte.
Aug. 2. 11 ^h 30 ^m A.M.	A severe shock from S. to N.		Hamb. Corresp. Nr. 139.
12. ——— 12. ———	A severe earthquake		Éphém. de Mannheim, p. 101.
Oct. 5. 10 ^h 45 ^m P.M.	A slight vibration		Mémorial de Chronol. t. ii. p. 932.
12. ——— 12. ———	An earthquake	900 persons perished during this earthquake	Gazette de France, 28 Nov.; Éphém. de Mannheim, p. 370; Cotte; Hamb. Corresp. Nr. 189, Beil.
20. 10 ^h 30 ^m P.M.	A severe earthquake	Seven houses were thrown down, and thirteen others violently shaken. The "Montes Forojulienses" were shaken, and on the 11th (or 21st?), at 7 A.M., a slight shock was felt "in montibus Taurianis," v. Hoff records the earthquake at Tolmezzo on the 10th, and says that forty houses were destroyed by it.	Gazette de France, 18 Nov.
29. About 11 P.M.	A severe shock from S. to N.	Accompanied at Cintra by subterranean noise	Hamb. Corresp. Nr. 206; Gaz. de Fr. 19 Déc.
Nov. 18. 2 A.M.	Some slight vibrations at Lisbon; stronger at Cintra.		

1.	2.	3.	4.	5.	6.
8. Nov 22. a. and on.	Ofen (Buda) and Esack in Hungary.	Several shocks.			Gazette de France, 19 Déc.; Merc. de Fr. 20 Déc.; Hamb. Corresp. Nr. 199.
— Dec. 18.	Arbhus in Mayence	A vibratory shock		Keilhan places this event on the 8th	Cotte.
— 23.	Mayence, Frankfurt, and the neighbourhood.	Two shocks at the hours mentioned respectively.		The day after snow fell, and a thaw began, but on the 26th the wind returned to the north, and the cold set in again with much severity.	Gazette de France, 20 Janv. 1799; Cotte.
— At the d of this ar, or be- ning of e follow- g ont.	Carlowitz in Hungary	An earthquake		Houses were thrown down	Hamb. Corresp. 1799, Nr. 14.
9. Jan. 18. P.M.	Mayence, Frankfurt, Ep- stein and Solms-Lau- bach; and more feebly at other places, as Cologne, Giessen, and Erfurt.	Several shocks			Gazette de France, 10 Fév.; Hamb. Corresp. Nr. 15, Bad, n. 17; Cotte; v. Hoff.
— 20. little be- re noon.	Mayence	Another shock			Ditto.
— Feb 7. 35 ^m P.M. P.M. in Ca- bria.	Mezzina, and in Calabria Ultra, especially at Monte-Leone and Reggio.	At Mezzina 2 shocks, the first very severe. They were undula- tory, and from E. to W. In Calabria Ultra three were felt.			Gazette de France, 10 Avril; Hamb. Corresp. Nr. 42; Cotte.
— 27.	Presburg in Hungary	An earthquake			Hamb. Corresp. Nr. 41.
— Mar. 31.	At Venice, Friuli, and the places around.	At Venice, Friuli, and Ditto			Ditto, Nr. 62.
— May 5. A.M.	Barnstaple in Devon- shire.	An earthquake shock from E. to W., last- ing one minute.		Accompanied by a rumbling noise	Gentleman's Magazine, vol. 112, p. 437.
— 17.	Pilsen on the Elbe in Saxony.	Two vibratory shocks		Some doors were cracked	Gazette de France 20 Janv.; Cotte.

Time	Place	Five minutes at rest.	Phænomena	Source
— 9 A.M. —	Barèges in the Pyrenees	One shock	made their appearance near Reikun, between the rivers Thomas and Huitaa. The level of the surface was in many places altered, particularly around the lake Thingvallevate, which became dry in places where formerly it was 12 feet deep, and on the contrary, on its eastern side, spread itself over its former shore.	Voyage en Islande; v. Hoff.
— 9 ^h 58 ^m P.M. —	13. Mannheim	Two pretty severe shocks from N.E. to S.W., rapidly succeeding each other.	Preceded by a low rumbling noise	Palassou, <i>loc. cit.</i> p. 269.
— Between 11 and 12 (A.M. or P.M.?) —	16. Mannheim and Oggersheim.	A vibratory shock	No damage done.	Gazette de France, 3 Juillet; Hamb. Corresp. Nr. 101; Cotte.
— 9 ^h A.M. —	17. Barèges in the Pyrenees again.	Another shock.	Accompanied by subterranean explosive noises.	Hamb. Corresp. Nr. 105, Beil.
— July 27. 15 minutes past noon. —	Adorf in the Voigtland.	Three shocks at intervals of five minutes. The first, the most severe, lasted one minute. Direction = N.W. to S.E.	Succeeded by light rain, the sky being covered with thick clouds. v. Hoff gives the date 23rd or 28th July.	Gazette de France, 28 Août; Hamb. Corresp. Nr. 125, Beil; Cotte.
— Aug. 4 and 5. —	4 Padua	Violent vibrations		Hamb. Corresp. Nr. 137.
— 26. 9 ^h 30 ^m A.M. —	Plaue in the Voigtland	A severe shock from E. to W.	The sky was clear, and the atmosphere suffocatingly hot.	Gazette de France, 6 Oct.; Cotte.
— — —	Pekin in China	An earthquake		Cotte.
— — —	Lisbon	A severe oscillation.		Hamb. Corresp. Nr. 164.
— Night between 27 and 28. —	Comrie in Perthshire	Two shocks on this day.		Edinburgh Trans. vol. iii. p. 240.
— At night. —	Wenlock in Shropshire.			Gentleman's Magazine, vol. lix. p. 947.

1.	2.	3.	4.	5.	6.
9. Sept. 30. 30 ^m A.M.	In Tuscany, the States of the Church, at Borgo-S. Sepolcro, Castello, and Florence.	At Borgo-San-Sepolcro a violent shock, lasting two minutes. It was feeblier at Florence, but again severe at Castello.		The earth opened near Borgo-San-Sepolcro, and houses with men and cattle were swallowed up. The little town of Surei, lying between Castello and Florence, was completely ruined.	Hamb. Corresp. Nr. 167; Cotte; Gaz. de Fr. 3 et 27 Nov.
— Oct. 28. out 6 A.M.	Edinburgh Bernek in the Black Forest. v. Hoff, this should probably be in the Fichtelgebirge.)	One shock earthquake Some shocks.		After a brilliant flash of lightning.	Cotte. Berlinische Nachrichten von Staats- und Gelehrten Sachen, 1789, Nr. 138.
— Nov. 5. 5 ^m P.M.	Cromarty and Grief in Scotland.	A shock from S.E. to N.W.		Attended by a rumbling noise	Cotte; Thomson's Annals of Philosophy, vol. viii. p. 367.
— 10. the fore- noon.	Comrie in Perthshire Ditto	Repeated shocks Another shock		Accompanied by a hollow rumbling noise. A pond in the neighbourhood had the sheet of ice with which it was covered shattered to pieces. On the 13th of this month the mountain of Willach in Upper Carniola separated into two after several days' rain. No earthquake mentioned. (Gaz. de Fr. 1 Janv. 1790.) The town of Novo-Castello and several villages were overwhelmed.	Edinburgh Trans. loc. cit. Thomson's Annals of Philosophy, vol. viii. p. 367.
— Dec. 24.	Calabria				Mém. de Chronol. t. ii. p. 232.
— 29. Jan. 2. noon.	Comrie in Perthshire Thfa, in the mountains, four leagues from Grenoble.	More shocks A violent shock			Edinburgh Trans. loc. cit. Gazette de France, 26 Janv.
— 10. and 14.	Ancona	Shocks on these three days.			v. Hoff.
— Feb. 27. A.M.	Village of Arnside in Westmoreland.	A violent shock		Accompanied by an explosion louder than thunder. At daybreak two clefts were found in the earth, one of which was very deep and 200 feet in length. Six houses and many cattle had sunk into it. The other chasm was smaller, and distant a league from the former. The motion of the sands raised several houses. The	Moniteur, 2 Avril; Hamb. Corresp. Nr. 43.

1790. Mar. 1. Torres-Vedras in Portugal.	A rather violent shock, but of short duration.			Gazette de France, 27 Avril.
— 5. Griesheim in Darmstadt 8 and 11 P.M.	Two severe shocks at these hours.			Ditto, 2 Avril; Hamb. Corresp. Nr. 45.
— 6. Ditto. Also felt at Darmstadt and in the Odenwald.	Another shock, of greater violence than the two former.			Ditto.
— 13. Breslau	A vibratory shock			v. Hoff.
— 18. S ^{ra} Maria di Niscemi near Terranova in Sicily.	Seven ditto. The sinking of the piece of land lasted until the end of the month.		Accompanying the gradual sinking of a piece of land of three Italian miles in circumference to the depth of 30 feet. From fissures in this spot, petroleum, sulphur, various vapours, hot water, and finally a stream of salt mud issued. Several houses fell, and considerable atmospheric disturbance was perceived. On the 31st of this month, at 8 A.M., the mountain Scylla fell into the sea, which was much agitated at the distance of two leagues. (Moniteur, 25 Avril; Gazette de France, 4 Mai; Cotte.)	v. Hoff. Ferrara, Campi Flegrei, p. 51; Huot, Géol. t. i. p. 113.
— Malta				Moniteur, 4 Juin.
— April. 6. The Baunat, all Transylvania, Volhynia, the Eukraine, as far as Constantinople, and the Crimea. The district shaken was comprehended by a line extending from Dubno in Volhynia (the most northern locality), towards the west to Brody and Lemberg in Galicia, more to the south, to Hermannstadt and Shuppaneck in the Bannat, and as far as Constantinople (the southern limit). To the east, from Dubno to Berdiczow, Kiew, Niemirow (in	A violent earthquake, the shocks lasting about five minutes, and being followed by some more during the night. At Bucharest they only lasted 11 to 14 seconds. The direction of the shocks was in general S. to N., except at Niemirow, where they seemed to follow the course of the Bug, which flows to the S. and W. of the town.		Accompanied by a noise like the discharge of a thousand muskets. The atmosphere was calm. At Roman, Jassy, Kaminiack, Bucharest, Ocza-kow and Zycomierz, more or less damage was done to buildings, &c.	Ditto. 16 Mai; Gaz. de Fr. 21 Mai; Hamb. Corresp. Nr. 67, Beil. Nr. 69 n. 84.

1.	2.	3.	4.	5.	6.
90. May ...	Podolia, Tulceyn, Bender, Oczakow, Cherson, and throughout the Crimea (the most eastern region). In the Val-di-Noto in Sicily.	An earthquake		Catanesetta was greatly injured, and Palombina built upon a promontory of tufa, sank into the sea. An eruption is reported to have occurred at one spot.	Hamb. Corresp. Nr. 91, Beil.
— June 10. A.M.	Ancona	A violent shock		The Hamb. Corresp. records this earthquake on Gazette de France, 20 Juillet; Moniteur, 23 Juillet; Hamb. Corresp. Nr. 111, Beil.	
— — 12. (A.M. or P.M.?)	Ditto	Another similar shock		Ditto.	
— — 14. Ditto		Ditto; still more violent than the two former.		Almost at the same time with these shocks others were felt in the Calabrias, the first of which were followed by terrible storms with thunder. In all probability the shocks given by v. Hoff on the 10th, 12th and 14th of January are merely the same with these, and the earlier date erroneous.	Hamb. Corresp. Nr. 136.
— July ... (light been 3 and 4.	Constantinople	Two shocks			
— — 4. Bâle		A vibratory shock			Meteorol. Registers of d'Announe and Huber.
— — 26. Pontremoli		A severe earthquake		Many buildings were injured. Venissus was in a state of energetic eruption about this time, according to letters from Naples dated the 28th. A piece of forest land (resting on granite) between the villages of S. Pedro de Alcantara and S. Francisco de Arripao sank 80 or 100 ft. and produced a lake of 400 toises in diameter.	Hamb. Corresp. Nr. 136.
— Sept. 21. At the mouth of the river Canra where it flows into the Orinoco, in the province of Caracas, S. America.		A violent earthquake			Humboldt, Relat. Hist. t. ii. p. 639; Hoot, Géol. t. i. p. 112.
— Oct. 8. On the south coast of Spain and north of Africa, especially the country about Oran.		Simultaneous shocks on the opposite coasts. At Oran twenty shocks were	At Carthagena the sea was so much agitated that the persons employed	At Oran great damage was done to the fortifications and city, and some lives were lost. At Santa Fe in Spain considerable destruction of property followed, several houses	Hamb. Corresp. Nr. 180, 182, 184; Cottey, Moniteur, 2 Nov. et 21 Dec.; Gaz. de Fr. 3 Nov.

1790. Oct. 13.	and Malaga; and in the interior as far as Santa Fe, west of Granada. Also at Malta.	edly up to the 25th. At Malta but one slight shock was felt.			
— — — 28.	Terni in the Romagna... In Calabria Ultra... Island of Tobago...	Another earthquake... Numerous shocks... Three earthquakes during this year.			Hamb. Corresp. Nr. 181, Beil. Ditto, Nr. 197. Ditto, Nr. 183.
— or 1791.	In the valley of Maurienne (department Mont Blanc).	Several shocks			Communication of Mr. Alexis Billet to M. Perrey.
1791. Jan. 24.	Darmstadt	A slight shock, followed by another at 4 A.M. the following morning.			Hamb. Corresp. 1791, Nr. 22.
— — — End of the month.	Aquila in Italy	Numerous vibratory shocks.		Some old houses were thrown down	Ditto, Nr. 32.
— Feb. Before the 22nd.	Calabria and the Abruzzo.	Shocks were still felt during the month, according to letters from Naples of the date given.	On the 2nd of this month the tide in the Thames rose two hours before its regular time and lasted so nearly eight hours. The water rose 3 feet higher than usual, a phenomenon which had not been known to happen for thirty years before. No earthquake, however, is spoken of.	A frightful storm had occurred at Catania, followed by earthquake shocks.	Ditto, Nr. 44.
— Between March and July.	Constantinople	Several shocks			Edinburgh Encyclopedia, Article Chronology.

1.	2.	3.	4.	5.	6.
1. April 4, Kamtschatka and 6. May 6. Ditto 16. East Haddam, Conn. Also United States. Also felt strongly at Kil- lingworth, about 20 miles distant.		An earthquake on these three days. Another earthquake. Two shocks in quick succession, of which the first was the more violent. Fol- lowed soon after by a third, slighter than the former, and by nearly one hun- dred still feebler shocks during the night. A slight vibration		The volcano Klutchevskoi sent forth smoke, Hoff. only. At Killingworth at the time of the shock the sub- limed out of the water in every direction. The atmosphere was very clear and warm, and the moon almost full, and remarkably bril- liant. Subterranean noises are constantly heard at East Haddam, whence its Indian name, Morechemodas, or the place of noises. After this shock, both noises and shocks be- came less frequent.	Ditto. Silliman's Journal, vol. xxix. p. 322.
M. Philadelphia, United States. Also felt at various other places in the eastern States; particularly at New York.					Earthquake, No. 130; <i>ibid.</i> 23 April.
17. Dijon 134° A.M.		Two distinct shocks like explosions in the space of three seconds. A lamp appeared to oscil- late from E. to W. Six more shocks dur- ing the night.			Effects of Volcan. Mercurius 2, 10 Lund; <i>ibid.</i> , 23 May; <i>ibid.</i> p. 31 May.
East Haddam, Conn., again. 18. From Boston to New York.		A severe shock, fol- lowed by a slighter one, the latter be- ing only felt at Hartford. During the night twenty or thirty more were felt. At Middle Haddam the first shock was severe and from W. to E.		The night very fine. Some damage was done. In the morning clouds were observed in the ground, and it was found that stones of several tons weight had changed their places. Probably the date of the shock at Philadelphia should be 18th instead of 1860.	

1791. May 21. Turin 1 A.M.	An earthquake .....	.....	The evening before a reddish halo had been observed surrounding the sun, which phenomenon was considered by many there as a sign of approaching earthquakes.	Hamb. Corresp. Nr. 96.
— July 8. In the Pyrenees, particularly violent in the commune of S ^{te} Marie. 3 A.M.	Violent shocks, but of short duration. At the village of Escot four oscillations were remarked, apparently in the direction W. to E.	.....	.....	Palassou, <i>loc. cit.</i> p. 269.
— Aug. 15. Tivoli and Frascati in the States of the Church.	Some shocks .....	.....	.....	Cotte.
— 29. Pressburg in Hungary Between 4 and 5 P.M.	Several shocks .....	.....	Accompanied by a terrible storm, which overthrew buildings, and did great damage in the forests.	Moniteur, 27 Sept.; Gaz. de Fr. 30 Sept.; Hamb. Corresp. Nr. 150.
— — — Lyons in France	One shock .....	.....	.....	Cotte.
— Sept. 2. Comrie in Perthshire	A vibratory shock .....	.....	.....	Edinburgh Trans. vol. iii. p. 240.
— 27. In the island of Jersey.. 9 P.M.	Two shocks.....	.....	Accompanied by a subterranean noise like the rolling of carriages. The evening was fine and starlight, and the wind soft, from the east. For many weeks great heat and drought had prevailed.	Hamb. Corresp. Nr. 169.
— Oct. 11. Foligno, Spoleto, Tolerino, and other places in the States of the Church. And at Rome itself.	At the first-named places very violent shocks. At Rome but two slight ones.	.....	At Foligno, Spoleto, &c. many houses were thrown down. At Rome no damage was done.	Ditto, Nr. 180 u. 181; Gaz. de Fr. 18 Nov.
— — 13. In the province of Capri (should probably read Island of Capri).	A violent earthquake.	.....	Much damage done to houses, &c.	Hamb. Corresp. Nr. 184; Gaz. de Fr. <i>loc. cit.</i>
— — 14. In the parts of the States of the Church shaken on the 11th.	About twenty shocks.	.....	.....	Hamb. Corresp. No. 180 u. 181; Gaz. de Fr. <i>loc. cit.</i>
— — 28. In England	A shock .....	.....	.....	Cotte.
— 29. Oran in Africa.....	A severe earthquake..	.....	.....	Hamb. Corresp. Nr. 189.
— — Sicily, Calabria, and Turkey.	Simultaneous shocks devastated these three countries.	.....	.....	Gaz. de Fr. <i>loc. cit.</i> ; Mém. de Chronol. <i>loc. cit.</i>
During this month.				

1.	2.	3.	4.	5.	6.
1. Nov. 27 10 ⁰⁰ p.m.	Lisbon	A rather severe earthquake, consisting of two shocks. The first was merely five or six vibrations succeeding one another so rapidly as to be scarcely distinguishable. The second and more violent shock was undulatory, and occurred about five minutes after the former.		The second shock was attended with a lightning noise like that of red-hot iron quenched in water, and ended with an explosion like the report of a cannon. The bells in one of the churches rang out loudly.	Annual Register, vol. xxxv. p. 8; Hamb. Correspond. 1792, Nr. 4.
- Dec. 2. Island of Zante		A violent shock followed by others up to the 18th.	The most violent agitation occurred in the strait between Zante and the Morea.	The first shock threw down many houses amongst others that of the Austrian General. A storm of rain, thunder, and lightning raged at the same time.	Frankf. Correspond. 1792, Nr. 6, 8, 9.
	In St. Paul's Bay in the month of May not (about sixty miles N.E. of Quebec) Canada.	Severe shocks		Walls were cracked, and stones fell from the roofs of houses.	Phil. Trans. (Vol. 45), vol. 2, p. 288; Trans. of Roy. Soc. Lond. (London), 2nd Series, vol. 7, p. 37 (1804).
1. Jan. Be-Bejs in Aleutje, Far- ing of tugal 1).		Several vibrations		Accompanied by subterranean noise	
- 22. Island of Martinique		A rather violent earthquake.			Journal des Mines, Nr. 18, p. 56.
Feb. Be-Bejs in some regions in Nor- ing of month.		Subterranean commotions.		Great cold on the 18th and 19th of this month. On the former day, at noon, much lightning and thunder.	Journal des Mines, Nr. 31 Mars.
- 25. In Lincolnshire		Shocks in the direction S.W. to N.E.			Phil. Trans. 1792, p. 311; Phil. Mag., Annalen, Td. 2, 3, 431.
Mar. 1. In Bedford, Leicester, Lincoln, Nottingham, and other counties		A rather severe earthquake, consisting of strong motions.		In Bedford's Encyclopedia, loc. cit., the date March is given.	Annual Register, vol. xxxv. p. 10; Brewster's Encycl. Article Churches, Mar. de Chronol. & c.

ON THE FACTS OF EARTHQUAKE PHENOMENA.

At the hour mentioned, at Stamford and Doncaster.	and lasting several seconds.				p. 932.
Mar. 7. In Algiers	An earthquake				Hamb. Corresp. Nr. 72.
— 9. Bale	A vibratory shock				Meteor. Reg. of d'Ansons and Dan. Huber.
— — — — —	More violent shocks than had been felt here for several months, during which time the volcano had not ceased trembling and sending forth smoke.				Ferrara, Descrizione dell' Etna, p. 131.
April 3. Palermo	One shock				
May 10. Messina	More than thirty shocks during the day; all of them, however, being slight.				Hoffmann in Poggenpuff's Annales, B. 24. S. 54.
— 11. Ditto	Very violent shocks, followed by innumerable others about Etna itself for a whole year.	No damage done			Spallanzani, Voy. dans les Deux Siciles, t. iv. p. 169.
Aug. 23. East Haddam, Conn., United States.	Three shocks	On the 21st of this month the sea rose at Sandvort in Holland higher than had ever been known before, and then sank suddenly again, the whole taking place in a few seconds. No shock mentioned. (Hamb. Corresp. Nr. 84.)	Accompanying a most violent eruption of Etna, which continued with more or less energy until May 1793.		Ditto; Ferrara, Descrizione dell' Etna, p. 131-137.
Nov. ... Sienna	Another earthquake	On the 10th December an unusually high tide at Haddam / Haddam Conn.	Subterranean noises were heard at 10 p.m. The weather was very fine. Perrey gives the date 24th October.		The Stillman's Journal, vol. xxxix. p. 338.
					Filla quotes Sakhai

1.	2.	3.	4.	5.	6.
.....	Anchita and Saks.	An earthquake .. Several shocks during the year.	.....	Produced the greatest consternation among the inhabitants.	Pérouse, Bull. des Sc. Nat. t. xvi. p. 60; Kelersten. Thomson's Annals of Philosophy, vol. viii. p. 367. Kelbau, &c. &c.
Jan. 1	(Christiansand in Nord- way.	An earthquake .. Another vibration ..	.....	Kelbau marks the year with (?) query, as if not certain of that part of the date. Accompanied by noise. The weather warm and fine.	Silliman's Journal, vol. xxix. p. 338.
Mar. 1	The Japanese island of Kout-Siou, particu- larly in the province of Simabava.	A frightful earthquake .. Two vibrations rapidly succeeding each other.	.....	The earth opened in chasms, masses of rock fell from the mountains, men could hardly re- main standing, &c. Preceded in January and February by volcanic eruptions in Japan and the Kurili Islands, and followed on March 2 by an eruption of Tuxtla in Mexico which lasted until November (v. Hoff). Accompanying a violent eruption of this volcano, from which a vast stream of water burst forth, destroying 53,000 men (?).	Titeing, Illustrations of Japan (trans- lated from the Dutch by F. Sho- bert), London, 1822; Humboldt, Fragmens Asiatiques, t. i. p. 220.
April 1	Around the volcano Illa- gigawa in Japan.	An earthquake ..	.....	.....	Ditto.
May 1	Hermannstadt in Tran- sylvania.	Two vibrations rapidly succeeding each other.	.....	More than thirty houses were overthrown	Hamb. Corresp. Nr. 69, Bel.
June 9	Lisbon ..	A slight earthquake ..	.....	Weather very warm. Rain and thunder after the shock.	Edinburgh Encyclopedia, Article Chronology; Moniteur, 12 Août. Hamb. Corresp. Nr. 118. Silliman's Journal, &c. &c.
July 6	East Haddam again ..	Another vibration ..	.....	.....	Nova Acta Acad. Imp. Petropol. vol. ii. p. 10.
Aug. 30	Irbatsk. Also felt at Laxmann at the distance of 120 wersts from that place. (In what direction?) bury.	An earthquake shock from S.W. to N.E., lasting two seconds. A severe shock of 42 secs. duration.	.....	Attended by a rumbling noise. The weather very calm, and what wind there was easterly. Followed by abundant rain	Gentleman's Magazine, vol. liiii. p. 950. Moniteur, 10; Venise, an. 2. Nova Act. Acad. Imp. Petropol. vol. iv; Hist. p. 71.
Sept. 29	Salisbury and Shaftes-	An earthquake shock	.....	.....	.....
Nov. 29	Lisbon ..	A severe shock of 42 secs. duration.	.....	.....	.....
Dec. 8	Kieff in Russia ..	An earthquake ..	.....	.....	.....

15

1793. Dec. 8.	In Transylvania	A severe vibratory shock.	.....	.....	.....	Hamb. Corresp. 1794, Nr. 2.
— — — 12.	In Hesse Darmstadt ...	A vibratory shock ...	.....	Accompanied by a violent rattling noise .....	.....	Ditto, 1793, Nr. 205, Beil.
— — —	Island of Timor	An earthquake .....	.....	High buildings were thrown down at Coupang..	.....	v. Hoff.
1794. Feb. 6,	Vienna and in Styria.	Ditto. At Vienna it	.....	At Grätz buildings were thrown down, as also in	.....	Hamb. Corresp. Nr. 28, Beil, Nr.
or 7. 1 P.M.	Near Vienna it was	lasted eight seconds.	.....	the Mürzthal, where a subterranean noise like	.....	31 u. 35.
	strongest in the parts	At Leoben oscilla-	.....	thunder was heard. At Leoben most damage	.....
	lying next the Danube,	tions were felt on	.....	was done.	.....
	and at Brünn. The	the 8th and 9th.	.....		.....
	central point of this		.....		.....
	earthquake, where it		.....		.....
	was most strongly felt,		.....		.....
	was Leoben.		.....		.....
— — — March 7.	At the city of Mexico...	Shocks at both these	.....	.....	.....	Sonneschmidt, Mineralog. Beschreib.
4 and 11 P.M.		hours, the first os-	.....	.....	.....	der vorzügl. Bergw.-Reviere von
		cillatory, the second	.....	.....	.....	Mexico, 1804, S. 323.
		a sort of heaving	.....	.....	.....
		motion from be-	.....	.....	.....
		neath.	.....	.....	.....
— — — —	Palermo	One shock .....	.....	.....	.....	Hoffmann in Poggendorff's Annalen,
			.....	.....	.....	B. 24. S. 54.
— — — 9.	East Haddam, Connec-	Two shocks, followed	.....	The atmosphere was clear in the morning, hazy	.....	Silliman's Journal, vol. xxxix. p. 339.
2 P.M.	ticut.	by a third at 11 P.M.	.....	and damp in the afternoon.	.....
— — — 14.	Casan	An earthquake .....	.....	The town was ruined .....	.....	Mém. de Chronol. t. ii. p. 932.
— — — May 12.	Innsbruck	One shock .....	.....	.....	.....	Hamb. Corresp. Nr. 86, Beil.
— — — June 12.	Naples, Caserta, through-	A very violent earth-	.....	Followed on the night of the 13th by the most	.....	Hamilton in Phil. Trans. 1795;
11½ P.M.	out Campania, and at	quake, with wave-	.....	tremendous eruption of Vesuvius since these	.....	Breislak and Winspeare, Memo-
	Benevento and Ariano	like oscillations	.....	of 1779 and 1631. For details, vid. v. Hoff.	.....	ria sull' eruzione del Vesuvio ac-
	in Apulia. Especially	from E. to W.	.....	The eruption proper lasted until the 22nd,	.....	caduto la sera del 15 Giugno,
	violent at the foot of		.....	and was followed by violent rains accompanied	.....	1794; Napoli, 1794; Gilbert's
	Vesuvius.		.....	by lightning, until the 7th July.	.....	Annalen, B. 4 u. 5; v. Moll, Jahr-
			.....		.....	bücher, &c. B. 1. S. 322. B. 5;
			.....		.....	v. Buch, Beobach. auf Reisen, B. 2.
			.....		.....	S. 104; Moniteur, 4 et 15 Ther-
			.....		.....	midor, 24 Messidor et 6 Fruc-
			.....		.....	tidor, An. 2; Audot, Roy. de Na-
			.....		.....	ples, p. 69, &c. &c.
— — —	All the country around	Numerous shocks.	.....	At Naples houses were thrown down. Torre-	.....	Ditto.
Night between	Vesuvius.		.....	del-Greco was buried beneath the lava (ac-	.....
13 and 14.			.....	cording to v. Hoff, on the night of the	.....
			.....	15th).	.....

1.	2.	3.	4.	5.	6.
June 15. At the eruption of Mount Vesuvius. A violent shock, the bottom of the sea being very irregular.				The eruption continued with the greatest violence, several new fissures opening, and lava streams issuing from them. About midnight the volcano became quieter.	Authorities quoted above (on the 12th).
— 16. Boxer, in the Bay of Naples, felt a slight shock.				The weather was calm; the sky a little clouded. Olivier, Voy. dans l'Empire Ottoman, t. i. p. 129.	
11 A.M. — At the eruption of Mount Vesuvius. A violent shock, the bottom of the sea being very irregular.				Accompanied by a noise like thunder. At the same time the greater part of the crater fell in, and the mountain thereby lost 454 Parisian feet of its height.	
July 3. In Turkey. An earthquake.					Edinburgh Encyclopedia, Article Chronology.
Aug. 12. Palermo. Ditto.					Hoffmann, <i>loc. cit.</i>
Sept. 3. Ditto.					Ditto
Oct. 11. Kingston in Jamaica. A violent shock, still more severe in the other parts of the island.					Moniteur, 29 Nivôse, An. 3.
— 28. At Canoa in the island of Canoa. Moderate shocks, lasting some seconds.				It was calm at the moment of the shock, but soon after the wind began to blow from the west, and continued in that quarter for some days. Earthquakes are not uncommon at this place.	Olivier, <i>loc. cit.</i> t. ii. p. 298.
— In Canoa, S. America. An earthquake.					Humboldt, Voyage (4th ed.) t. i. p. 307.
Jan. 2. County in Perthshire. An apparently perpendicular shock.					Gentleman's Magazine, vol. lxxv. p. 74.
Apr. 29. Constantinople. Slight shocks.					Moniteur, 1 Juillet.
Sept 23. At Ober-Cassel near Bonn. A trembling shock.					Kastner, Archiv für Physik, B. 3. S. 382.
Nov. 18. In England, extending from Leeds to Liverpool. A violent shock, the bottom of the sea being very irregular.				The wind had been S.W., and afterwards changed to N.W., followed by rain and suffocating heat. The motion of the earth was accompanied by a subterranean rolling noise. At Derby a fire ball, and at other places a luminous streak were observed in the heavens. The workmen in the Gregory mine at Ashover heard an	Phil. Trans. 1796, p. 363; Gilbert's Annalen, B. 4. S. 59; v. Moll's Annalen, B. 2. S. 431.

1795. Dec. Day not given. 2 ^h 10 ^m P.M.	Aleppo.....	Two shocks, the second being the more severe and rapidly succeeding the other. Apparent direction = N. to S.	.....	Houses were cracked Olivier, <i>loc. cit.</i> t. vi. p. 360.	plosive noise, and perceived a blast of wind in the upcast shaft. At Kenilworth the barometer fell from 30.28 in. to 28.8 in. between the morning of the 17th and the evening of the 28th. The Annual Register (vol. xxxviii. p. 64) gives the date 23rd November, a little before 11 P.M., for Birmingham and the country round; and the Bibliothèque Britannique (t. i. p. 124) reports it on the 28th Oct. at 11 ^h 5 ^m P.M., mentioning a number of places where it was felt.
—	In the province of Simabara, island of Kian-Siou, Japan.	An earthquake .....	.....	55,000 men lost their lives on this occasion. It is not this merely a confusion of the two accounts of March 1 and April 1, 1793? They all, probably, refer to the same event. In this year a new volcanic island seems to have risen from the sea in the Aleutian group, off the coast of Kamtschatka. No shocks are mentioned at this time, though later such were felt in Unaschka (v. Mell's <i>Neue Jahrbücher</i> , u.s.w. B. 2. S. 392).	Is Titsing, Illustrations of Japan.
1796. Jan. 10.	Lisbon	A severe shock .....	.....	.....	Hamb. Corresp. Nr. 41; Cotte.
— — 17.	Ditto	Another .....	.....	.....	Ditto; <i>Mém. de Chronol.</i> t. ii. p. 932.
— — 27.	Ditto	Ditto, so violent that it was thought a second similar one would have destroyed the city. The earth shook up to the 21st February.	.....	For some time storms had been experienced here, accompanied by extraordinary rains.	Hamb. Corresp. and Cotte, <i>loc. cit.</i> ; Moniteur, 20 Germinal, An. 4.
In the morning.					
— Feb. Night between 4 and 5.	Florence, and more violently at Arezzo.	A rather severe shock, much more violent at Arezzo, where it was succeeded by others.	.....	Chimnies and some buildings were destroyed ...	Moniteur, 15 et 17 Ventôse, An. 4; Cotte.

1.	2.	3.	4.	5.	6.
Feb. A violent shock before 6.	In Canada	A violent shock		Some of the rocks of the Falls of Niagara fell. The letter, dated Neward in Upper Canada, Mar. 6, says "lately" as to the date of this event.	Bibliot. Britann. t. ii. p. 86; Keferstein.
March 3	Ulm	A vibratory shock			Hamb. Corresp. Nr. 46.
April 20.	Baile...	Ditto			Meteor registers of d'Annone and Huber.
— 26. In Asia Minor, especially at Latakiah (Laodicea), 9 A.M.		A most destructive earthquake. The first shock, which was the most violent, and that which overthrew the houses, raised the surface of the ground several fathoms. The others were horizontal, and seemed to pass in the direction E. to W., i. e. from the land towards the sea. They lasted nearly a minute, diminishing in force from first to last. Two months after, slight tremblings, and subterranean noises were perceptible.	The sea was perfectly calm.	The air was quite still, and the sun had a pale appearance before the shock. It was preceded by a subterranean noise, followed almost instantaneously by that of the falling houses. These latter fell so suddenly that even the people living on the street level were unable to reach the threshold in time to save themselves. The tobacco custom-house fell in, and the aga, his officers, and 400 workmen lost their lives in it. Altogether the third of the houses were thrown down, and the remainder more or less injured. Fifteen hundred persons perished.	Olivier, loc. cit. t. vi. p. 358; Cotte.
October. Bienne in Switzerland...		Two severe shocks, lasting nearly a minute. Apparent direction = S. to N.			Moniteur, 25 Brumaire, An. 5.
Oct 21					
Oct 22.	In the territory of Modena.	A vibratory shock			Cotta.
— 23. Ripon in England		An earthquake		A cliff opened in the ground, from which water issued.	Gentleman's Magazine, vol. lvi. p. 873.

1796. Oct. Day not given. 2 P.M.	Manilla in the island of Luçon.	A violent earthquake, lasting altogether three minutes four- teen seconds. Seve- ral minor shocks were felt on the fol- lowing days.	In vessels at anchor at Manilla the shock was not felt, but an English ship at sea, eleven leagues from that place, was greatly injured by it, her mainmast being driven up out of the step, by the blow from be- neath.	During the shock the air was hot and close, and perfectly calm. Water was thrown out of the gutters and wells; so that a large cistern, which was full before the shock, was found to be diminished in depth to the extent of 3 inches. After the shock the narrator felt stupefied, and suffered pains in his knees.	De Guignes's account of the Phi- lippine Islands, in Pinkerton's Voyages and Travels, vol. xi. p. 84.
—	Copiapó in Chili.....	An earthquake .....	.....	.....	Basil Hall, Journal written on the coast of Chili, vol. ii. p. 25.
1797. Feb. 4. 7½ A.M.	In the territory of Quito, S. America. The cen- tre of disturbance seems to have been the volcano Tungu- ragua; and the most violently shaken di- strict extended forty leagues from S. to N. and twenty from W. to E. The earthquake was perceptible over a space of 170 leagues from S. to N. (from Puerá to Popayan) by 140 from W. to E. (from the river Napo to the sea).	A terrible destructive earthquake. The first wave-like vi- brations (at 7½ A.M.) lasted nearly four minutes. At 10 A.M. and 4 P.M. more shocks were felt. They recurred at intervals up to the 5th April, on which day at 2½ A.M. they were but little less violent than the first.	Flames and suffoca- ting vapours burst forth from the lake of Quilotoa in the district of Llacta- cunga, and destroy- ed herds of cattle feeding on its shores.	Accompanied by loud subterranean noise. Simi- lar noises had been heard from time to time in the interior of Tunguragua since 1791. Within the most violently disturbed district all the towns and villages were ruined, the houses being thrown down, and many crushed beneath great masses of detached rock. 40,000 persons perished. The ground about Tungu- ragua opened into enormous clefts, from which volumes of water and stinking mud issued, forming lakes in many places of considerable size. Tunguragua remained perfectly still during the earthquake, and the smoke of the volcano Pacto, seventy-five leagues distant, disappeared suddenly into the crater.	Annales de Historia Natural, t. i. Nr. 4, Madrid, 1800; Journal de Physique, t. xlix. p. 230; Gil- bert's Annalen, B. 6. S. 67; Hum- boldt, Voyage (4to), t. i. p. 317; v. Moll's Annalen, B. 2. S. 435. &c. &c.
About this time.	The Lesser Antilles ...	A series of shocks began at this time, which did not cease for eight months, until the eruption of the volcano in Gua- daloupe on the 27th September put an end to them.	.....	.....	Ditto.

1.	2.	3.	4.	5.	6.
Feb. 20. Island of Sumatra, a violent earthquake was felt in the district of Padang, and the shocks for three hours west to the equator of 2 latitude towards the south.					
Mar. 8. Palermo	An earthquake				
July. Kingston in Jamaica	Some slight vibrations				
Aug. 11.	Some slight vibrations				
Aug. 13.	Some slight vibrations				
— 13.	Some slight vibrations				
Sept. 8.	Some slight vibrations				
Oct. 10.	Some slight vibrations				
Nov. 12.	Some slight vibrations				
Dec. 11.	Some slight vibrations				

Gentleman's Magazine, vol. lxviii. p. 344; Phil. Trans. 1806, Pt. 2. p. 269; France's Notizen, Nr. 570.

Hofmann in Poggendorff's Annalen, loc. cit.
Hamb. Correspond. Nr. 167.

Palassou, loc. cit. p. 269 and 270.

Ditto.

Ditto.

Moll's Annalen, B. 2. S. 442; Voigt's Magazin für das Neueste aus d. Phys. u. Naturgesch. B. 1. Nr. 2. S. 143.

Cette. Humboldt, Voyage, t. II. p. 278.

The town of Cumana was ruined, and terrible devastation produced in its neighbourhood. The state of the surface of the ground was changed in some places. Half an hour before the violent shocks a smell of sulphur was observed. On the bank of the Manzanares and

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The two shocks at 9½ p.m. were preceded by a heavy rolling noise.

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wards.			in the bay of Cariaco near Maraquitas flames came up from the earth, <i>followed by a subterranean noise like bubbling, and then by the shocks.</i> The latter were like the springing of a mine at a great depth, and laid four-fifths of the city in ruins.	Moniteur, 27 Pluviôse, An. 6.
1798. Jan. 31. Parthenay - le - Peuple, France.	A very feeble shock.....		At Bitche a part of the arch of the bridge was raised. The district in which this shock was felt contains many mines of coal, of which one, like the Solfatara of Naples, is continually burning. Some days before, a meteor was observed three leagues from Metz.	Ditto, Germinal, An. 6.
— Mar. 14. Sarreguemines, Bliastel, and other communes of the department la Meurthe.	A very violent shock.....		At Florence many buildings were seriously injured. The shocks were preceded there by a loud explosion. It was remarked that they were less violent on the side towards the sea. For some days before the air had been very close and hot, but after the earthquake severe cold set in. On the 21st and 22nd a tremendous storm raged from Fiume in the Adriatic to Hungary.	Hamb. Corresp. Nr. 97, 99, u. 102; Moniteur, 30 Prairial, 1, 2, 3, 6, et 10 Messidor, An. 6.
— Until July.	Repeated vibrations during this period.		At Florence many buildings were seriously injured. The shocks were preceded there by a loud explosion. It was remarked that they were less violent on the side towards the sea. For some days before the air had been very close and hot, but after the earthquake severe cold set in. On the 21st and 22nd a tremendous storm raged from Fiume in the Adriatic to Hungary.	v. Hoff.
— May 26. 1 ^h 15 ^m A.M.	At Florence a severe earthquake. The shocks lasted until daybreak, when the last and most severe occurred. At Sienna the motion was undulatory and as severe as at Florence.		At Florence many buildings were seriously injured. The shocks were preceded there by a loud explosion. It was remarked that they were less violent on the side towards the sea. For some days before the air had been very close and hot, but after the earthquake severe cold set in. On the 21st and 22nd a tremendous storm raged from Fiume in the Adriatic to Hungary.	Hamb. Corresp. Nr. 97, 99, u. 102; Moniteur, 30 Prairial, 1, 2, 3, 6, et 10 Messidor, An. 6.
— Beginning of the following night.	Another shock		At Florence many buildings were seriously injured. The shocks were preceded there by a loud explosion. It was remarked that they were less violent on the side towards the sea. For some days before the air had been very close and hot, but after the earthquake severe cold set in. On the 21st and 22nd a tremendous storm raged from Fiume in the Adriatic to Hungary.	Moniteur, loc. cit.
— 27. Between 3 and 4 A.M.	Ditto, equally violent. Others were felt on the 28th. Up to the 6th June twenty-two shocks had been felt, of which two were very violent.		At the end of the month the city was nothing but a mass of débris. A very deep chasm had formed in the principal square.	Ditto.
— June 14. Leghorn	A slight shock, followed in two hours by a stronger. Supposed direction = N. to S.		At the end of the month the city was nothing but a mass of débris. A very deep chasm had formed in the principal square.	Moniteur, 21 Messidor, An. 6.

1.	2.	3.	4.	5.	6.
June 17 "Western part of the island of Tenriffe, night."		Some vibrations.		Accompanied by loud explosive noises, heard over the whole island. Followed by a great eruption of Chaborra or Venge, a volcano close to, or rather on the side of the Peak of Teneriffe. This eruption lasted three months and six days. For details, vid. v. Hoff.	Bory de St. Vincent, Essai sur les îles Fortunées, p. 295; v. Buch, Canar Ins. S. 235, &c.
August. From Peru in Russia to several localities from mining of the Gurala, over a S.W. to N.E. space of 500 wersts in length by 150 in breadth.				Preceded by subterranean noise	Nova Acta Acad. Imp. Petropol. vol. xiv.; Hist. p. 44.
Nov. 7. Bordeaux and the country.		Concussions, associated with tremors.		In the country some new wells fell	Moniteur, 27 Brumaire, An. 7; Hamb. Correspond. Nr. 189.
— 13. Scandun		Some slight shocks.			Illamb. Correspond. Nr. 195.
Dec. 10. Calabria		Another earthquake.		This notice was written from Frankfurt on the Maine on the 13th December, and merely said that Calabria had again suffered from an earthquake.	Iditto, Nr. 203; Bell.
Between the rivers Guaviare and Rio-Negro in the north of South America.		An earthquake	On the 17th December the sea rapidly rose above its usual level and extended 5 kilometres as far as Aigues-Mortes (France). (Moniteur, 10 et 12 Novembre, An. 7.) No shock is mentioned, but Ferrey considers it as an instance of a "terre moto di mare."		v. Hoff.
In Guatemala		A violent and destructive earthquake.	Some time in this year there was remarked a violent and unusual motion of the sea on the English coast. No shock.	In April there was an eruption of the volcano Iscalco in Guatemala. (v. Buch.)	Esquary et Hirth, Dict. de Géogr. t. iv. p. 508.

1799. Jan. Night between 7 and 8.	In Iceland	An earthquake	spoken of. (Férus- sac, Bull. des Sc. math. &c. t. iii. p. 176.) The sea inundated the country.	Accompanied by a terrible storm	Moniteur, 29 Prairial et 1 Messidor, An. 7.
17. ———	Comrie in Perthshire ...	A shock from W. to E. of 2 secs. duration. At Caen (before 4 A.M.) some shocks, appar- ently from N. to S. At Laval (3 ^h 45 ^m) a pretty smart vibra- tion. At Nantes (about 4) a severe shock, lasting more than a minute. At La Flèche (4 ^h 15 ^m) a shock of 25 secs. At Bordeaux a shock from W. to E., lasting more than a minute. At Machecoul several other shocks were felt during the day, the most severe being at 9 A.M. At the islands of Bouin and Oléron two shocks from S.W. to N.E.	.....	Accompanied by a subterranean noise	Thomson's Annals of Philosophy, vol. viii. p. 367.
25. ——— About 4 A.M.	On the west coast of France; at Rouen, Auxerre, Nantes, in La Vendée, at Ro- chelle, island of Olé- ron, Rochefort, Bor- deaux, Laval, Caen, &c., and in Jersey. Also, according to some, in Paris itself.	.....	.....	At Nantes and the island of Bouin (La Vendée) loud noise was heard. At Machecoul it rained soon after the shocks, and thundered all day. At the island of Bouin many houses were thrown down. The atmosphere appeared fiery- red, and soon after the earthquake a violent wind arose, which lasted two days. v. Hoff records another earthquake in the same region on the 26th January, 1800, but from the par- ticulars given that date is obviously erroneous, and the account refers to the earthquake here given.	Journ. de Phys. t. xlviii. p. 181; Mo- niteur, 11, 14, 17 et 19 Pluviôse, 4 et 13 Ventôse, An. 7; Hamb. Corresp. 1799, Nrs. 25, 30, n. 35; Cotte, &c.
Feb. 5. Nantes .....	.....	Another very slight shock.	.....	Accompanied by noise, without undulation, like a prolonged bellowing, or the rolling of a car- riage.	Moniteur, 27 Pluviôse, An. 7; Hamb. Corresp. Nr. 33.
6. Ditto .....	.....	Another shock, rather more perceptible than the last.	.....	Accompanied by the same noise as before, but a little louder.	
2 ^h 10 ^m P.M.	.....	Two violent shocks...	.....	.....
19. Avignon .....	.....	.....	.....	An old bridge and some houses were thrown down.	Moniteur, 13 Ventôse, An. 7; Cotte.
4 P.M.	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
1799. Feb. Night between 21 and 22.	Frankfort on the Maine and Giessen. Also sup- posed to have been felt at Dusseldorf.	Earthquake shocks		Accompanied by a terrible storm, with light- ning, &c.	Moniteur, 27 Ventôse, An.7; Hamb. Corresp. Nr. 37 u 46.
— 24.	6 omie in Perthshire	A shock from W. to E., lasting 2 seconds.		Attended with subterranean noise	Thomson's Annals of Philosophy, vol. viii. p. 367.
—	Breslau	Vibratory shocks.			v. Hoff.
— March 5.	Nice	Another earthquake			Moniteur, 27 Ventôse, An.7; Hamb. Corresp. Nr. 50.
4 ^h 30 ^m A.M.					Hamb. Corresp. Nr. 78.
— April 20.	Drontheim in Norway	An earthquake			
6 P.M.					
— or Iceland		Ditto		Very probably at the same time with the Dron- heim earthquake.	Ditto, Nr. 88.
in May.				Houses were thrown down	Ditto, Nr. 100.
— May 29.	Brescia	A severe earthquake			Ditto, Nr. 181; Moniteur, 11 Bru- maire, An. 8.
— June 17.	Acapulco	A destructive earth- quake.			Hoffmann, <i>loc. cit.</i>
— Aug. 18.	Palermo	An earthquake			Humboldt, Voyage, t. iv. p. 18, et t. x. p. 333; v. Zach, Monath. Corresp. Th. 1. s. 395.
—	In the mountains of Caripe and Carapano, near Cumana, South America.	Eleven severe shocks.		v. Hoff gives the date 28th August	
— 25.	Cumana	A slight shock			Humboldt, <i>loc. cit.</i>
Sept. 5.	In Ekaterinodar (Russia)	Two severe shocks. At sunrise on this day rapidly succeeding each other. (During the rising of the island in the Sea of Azov also, vibrations were felt this day through- out the Kouban.)	At sunrise on this day a new island rose from the Sea of Azov opposite Temruk (200 wersts to the west of Ekaterino- dar). This island was full of fissures, and threw forth stones, mud, flames and smoke. The fol- lowing year it no longer existed.		Pallas, Reise in d. südl. Statthaltersch. des Russ. Reichs, Th. 2. s. 316; Keferstein, Moniteur, 29 Floréal, An. 8; Dubois de Montpereux, Voy. autour du Caucase, t. v. p. 32.
7 P.M.					
— 29.	Albano was apparently the centre of these shocks, which ex- tended to Rome, Ma-	Repeated vibrations during this period.			Constitutionnel, 14 Juin, 1829; Preuss Staatszeitung, 1829, Nr. 170.
to the end of the year.					

1799. Oct. About the middle of the month. — — —	rino, Larice and Gen- sano. Lisbon	Two slight vibratory shocks.	.....	.....	Hamb. Corresp. Nr. 181.
— Nov. 4. 4 ^h 12 ^m P.M.	Hirschberg in Silesia	A vibratory shock .....	.....	.....	Berliner Spensersche Zeitung, 1837, Nr. 73.
— Nov. 4. 4 ^h 12 ^m P.M.	Cumana, S. America	Two shocks, followed by a third, much feeblér, at 9 P.M. The first two were in the (there un- common) direction N. to S., and there was an interval of 15 seconds between them.	.....	.....	Moniteur, 4 Floréal, An. 9; Hum- boldt, Voyage (8vo), t. iv. p. 16; Keferstein.
— Dec. 11. In the after- noon.	In Silesia; at Schweid- nitz, Glatz, Freders- dorf, Dittersdorf, Fried- land, Liebwerta, Wit- tichsthal, Haindorf, Raspennau, Hirschberg, all the villages of the Riesengebirge, Schmie- deberg, Landeshut, &c., for the most part in a line from Glatz to Mar- klissa.	At Schweidnitz there was an oscillation of the surface con- sisting of three suc- cessive movements, quickly following each other. At all the other places the shocks were felt more or less vio- lently, for the most part in the direc- tion S. to N.	.....	.....	Voigt's Magazin, Th. 2. s. 263; Gil- bert's Annalen, B. 4. s. 128, u. B. 5. s. 203; Neue Schriften der naturforschenden Freunde zu Ber- lin, B. 3. s. 180, 191 u. 199, &c.
— At the end of the year.	In the Calabrias and at Messina.	Violent earthquakes .....	.....	.....	Moniteur, 8 Pluviose, An. 8.

1.	2.	3.	4.	5.	6.
1799. Some time during the latter half of the year.	Truxillo ("in Honduras, Venezuela, or Peru?").	A destructive earthquake.	.....	Very probably this alludes to the Cumana earthquake of the 4th November.	Hamb. Corresp. 1800, Nr. 20, Beil.
1800. Jan. 12 & 22. (O.S.?)	In the mines of Koutomarsk, near Nertschinsk, in the Ourals.	Some shocks from S.W. to N.E.	.....	Preceded each time by an explosion like that of a 6-pounder, the noise lasting about 2 secs.	Bull. des Sc. Nat. t. viii. (Mai 1826) p. 21.
— Feb. 26. 9 P.M.	Lisbon	One shock .....	.....	Accompanied by heavy rain. Buildings were injured.	Hamb. Corresp. Nr. 52.
— 27. 3 A.M.	Ditto	Ditto .....	.....	An eruption of Etna began on this day which recurred at intervals until the middle of the year 1802.	Ditto; v. Hoff.
— March 8. 9 A.M.	At Mexico	A violent earthquake. The motion was first for 4 mins. from E. to W., then for some time from N. to S., and finally in a circular direction.	.....	Many buildings were injured, and finally the earth opened in clefts.	Annales de Historia natural (Madríd), t. ii. No. 5. p. 235.
— 17. 10 ^h 18 ^m A.M.	Ditto, and at the same time at Cuernavaca.	Repeated, but slight vibrations.	.....	The air was stormy, and a tempest blew from the south. Two days before, the barometer oscillated to a great extent.	Ditto.
— — —	Philadelphia in the United States.	One shock .....	.....	.....	v. Hoff.
— — —	On the banks of the Ganges.	.....	.....	.....	Philosophical Transactions.
— April 1.	Port-Rieux in Bretagne.	An earthquake .....	.....	.....	Hamb. Corresp. Nr. 64.
— June 23.	Palermo	Ditto .....	.....	A letter from London of the 17th July says that a chasm had opened in Breadon Hill, Worcester-shire, and was daily enlarging. It was supposed to have been caused by a late earthquake there, but when this occurred is not said. Possibly that of the 18th November, 1795, is alluded to. (Allgemeine Zeitung, 1800, no. 212. s. 894.) In the neighbourhood of Nice the fall of a mountain is also recorded about the end of July, no earthquake, however, being mentioned. (Allgemeine Zeitung, no. 231. s. 970.)	Hoffmann, loc. cit.

1800. Sept. Night of 23— 24. 0 ^h 50 ^m A.M.	Genoa	A violent shock, last- ing some seconds.	.....	.....	Moniteur, 21 Vendémiaire, An. 9; Hamb. Corresp. Nr. 166, Beil.
— — — 26. Oct. 17. 5 ^h 4 A.M.	Constantinople	Several shocks .....	.....	.....	Mém. de Chronol. <i>loc. cit.</i>
— — —	At Eaux-Chaudes and some other places in the valley of Ossau, in the Pyrenees.	Two shocks in the space of 5 minutes.	.....	A great mass of rock was detached, and rolled some distance.	Palassou, <i>loc. cit.</i> p. 270.
— — — 18. Nov. 3. 11 A.M.	Ditto	Another shock .....	.....	.....	Ditto.
— — — 9.	Zurich	A slight shock.....	.....	.....	Moniteur, 26 Brumaire, An. 9.
— — —	Brussels. Also, perhaps. in Brandenburg.	Two shocks at Brus- sels.	.....	.....	Hamb. Corresp. Nrs. 183, 184, 185, 186 n. 189; Moniteur, 25 Bru- maire, An. 9.
— — — 29.	Philadelphia in the United States.	A severe shock .....	.....	.....	Hamb. Corresp. 1801, Nr. 15.
— — — Dec. 25.	Newport, Hanover, Bos- ton, Concord, and other places in the United States.	Ditto .....	.....	.....	Moniteur, 24 Ventôse, An. 9.
— — —	Inverness in Scotland...	An earthquake .....	.....	.....	Thomson's Annals of Philosophy, vol. viii. p. 367.
— — — & 1801.	Châteauroux (depart. Indre) in France.	Several shocks felt at this place in the course of the 2 years.	.....	.....	France pittoresque, t. ii. p. 92.
1801. June. 1st or 2nd Monday in the month.	Chester and the neigh- bourhood (England).	Rather a smart shock.	.....	.....	Moniteur, 24 Prairial, An. 9.
— — — July.	Eskilstuna in Söder- mannland, Sweden.	A violent earthquake.	.....	Houses were thrown down, mountains over- thrown, and great damage done.	Ditto, 27 Vendémiaire, An. 10 (quoting "la rubrique de Stock- holm, 8 Août").
— — — Sept. 7. 6 A.M.	Edinburgh, Glasgow, Perth, Callander, Crieff, Stirling, and over al- most the whole of Scot- land. The centre ap- peared to be at Comrie in Perthshire.	Several vibratory shocks from N. to S. at Edinburgh.	.....	Unaccompanied by noise	Tilloch's Phil. Mag. vol. x. p. 368; Thomson's Annals of Phil. vol. viii. p. 367; Moniteur, 8 Vendémiaire, An. 10.

1.	2.	3.	4.	5.	6.
1801. Sept. Night between 10 and 11. — Oct. Night between 3 and 4. At midnight. 3 A.M. & 4 A.M.	Colmar and Neu-Breisach. Semlin on the Danube. Not felt in the environs.	A severe vibratory shock from N. to S. at Neu-Breisach. Three shocks at the hours given. The 1st was more violent than the 2nd, and the 3rd more so than either of the former. One of them lasted four minutes.		Followed by heavy wind and rain, which lasted several days.	Hamb. Corresp. Nr. 151, Beil; Moniteur, 3 ^{me} jour. complémentaire, An. 9; Cotte. Moniteur, 10 et 13 Brumaire, An. 10.
— — — 8. 8 ^h 52 ^m 53 ^s A.M.	At Bologna. Also, about same time, at Cesena; and in a part of the Romagna.	At Bologna, 3 shocks from N.E. to S.W., the undulation of the 1st (which took place at the time mentioned) diminishing by degrees until the 2nd and 3rd were felt. The three lasted only half a minute. One shock		The atmosphere was calm, the sky overcast, and the thermometer at 13°.75 R. One of the clocks of the observatory was stopped, thereby giving the time of the occurrence. Some bells sounded of themselves, and a few chimnies were thrown down.	Ditto, 5 et 6 Brumaire, An. 10. (from an account by Sig. Ciccolini, director of the observatory); v. Moll's Annalen, B. 2. s. 451.
— — — End of the month.	Frascati, Monte-Pozzio, Albano, Riccia, Velletri, and the surrounding district.	One shock			Moniteur, 6 Frimaire, An. 10.
— Nov. Night between 12 and 13.	Philadelphia, United States.	A vibratory shock			Hamb. Corresp. 1802, Nr. 25.
— — — 14.	Palermo in Sicily	One shock			Hoffmann in Poggendorff's Annalen, B. 24. s. 54.
— (Beginning of December?)	Laybach in Carniola. Also at Eger.	A violent earthquake.		At Eger part of the fortifications fell	Moniteur, 18 Nivôse, An. 10 (quoting "la rubrique de Vienne, 22 Déc.").
—	Maracaibo, Caraccas and Porto-Caballo in South America.	Several shocks			Humboldt, Voyage, t. v. p. 13; De Pons, Voyage à la Terre-Ferme, t. i. p. 125.
1802. Jan. 1. 6 ^h 45 ^m or 7 ^h 15 ^m A.M.	Strasburg	From N. to S.		Great and wide-spread inundations for a month before.	Moniteur, 20 Nivôse, An. 10; Hamb. Corresp. 1802, Nr. 9, Biel.

1802. Jan. 4. Laybach, Trieste, Fiume and Bukkari in Carinthia. Also in the Banat, and in Turkey.	At Laybach, slight. At Trieste, very violent. Several violent shocks from N. to S. at Fiume and Bukkari, each lasting more than a min.	At Fiume and Bukkari the sea rose in masses upon the shore.	In Carinthia some little hills disappeared, and new elevations were formed. Preceded, the same night, at Trieste by a terrible storm of thunder, rain, hail and snow, and a frightful inundation of the sea.	Moniteur, 7, 10, 16, 25 Pluviôse, et 3 Ventôse, An. 10.
About same time with the last.	Seigneurie of Grobbling (in Austria?).		Caused the fall of several masses of rock and the sinking of the earth in some places. Followed by terrible rain; accompanied by thunder and lightning. Probably the same shock with that last recorded.	Ditto, 12 Pluviôse, An. 10 (sous la rubrique de Vienne, 17 Janv.).
17. 9 ^h 15 ^m A.M.	Caumont in the depart. Calvados, Normandy.			Hamb. Corresp. 1802, Nr. 21.
—	Torre-la-Mata and Torrevieja in Spain.		Some houses were destroyed.	Ann. de Chim. et de Phys. t. xlv. p. 395.
23. In the evening.	Strasburg			Hamb. Corresp. 1802, Nr. 21, Biel.
— Feb. 2.	Palmouth in Antigua			Moniteur, 24 Germinal et 25 Floréal, An. 10.
—	Guadaloupe		Accompanied by the eruption of a volcano	v. Hoff.
— Mar. 19.	Antigua, St. Christopher's, and other West Indian islands.	Accompanied by great agitation of the sea.	v. Humboldt remarked smoke issuing from Antisana in the Andes during this month of March.	Hamb. Corresp. No. 79; Moniteur, loc. cit.
— April 5.	Orvieto in the States of the Church.			Hamb. Corresp. Nr. 73.
— May 9.	Lodi, Crema, and the country around.		Very probably the same event with the following, the date being incorrectly reported.	Tilloch's Magazine, vol. xiii. p. 95.
10 ^h 40 ^m A.M.	In Northern Italy, especially at Crema, Sonzino, Tegengo, Orzinovi and Brescia.		Most violent from west to east along the southern slope of the Alps. At Crema, Sonzino, Tegengo and Orzinovi the most damage of buildings, &c. occurred. At Brescia 11 houses and 3 churches fell. At Parma the direction was given by the swinging of a suspended lamp, which deviated 8 inches from the vertical. At this place the sky was quite clear and free from clouds, the barometer perfectly steady at 28 in., and the thermometer standing at 18° 25. At Genoa the motion was accompanied by a noise like the roll-	Cotte; Hamb. Corresp. Nrs. 87, 89, 93 u. 96; Moniteur, 6, 9, 10, 15 Prairial; Journ. des Débats, 4, 5, 9, 10, 15, 17 Prairial, et 18 Messidor, An. 10.
10 ^h 10 ^m A.M.	at Mantua;			
10 ^h 30 ^m at Milan;				
10 ^h 35 ^m at Parma;				
11 ^h in Switzerland.				

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	At Cremona the motion was violent, but at Venice it was not felt. It was but slight at Turin, in Piedmont, and as far as Roveredo. Near Bard, and at Crema the shocks frequently recurred for three weeks.		ing of carriages or a distant cannonade. Near Bard openings appeared in the earth, from which much petroleum was procured. The castle of Marguin, situated on the shore of a small lake, sank down and was covered by the water. At Berne furniture was shaken in the rooms, particularly in those of the third storey. An old man and a young woman were thrown down, and the bell of the Maison de Ville sounded.	
ay 15. In the territory of Darmstadt.	A violent shock of 15 to 20 sec. duration.			Journal des Débats, 17 Prairial, An. 10.
ly 7—Strasbourg or 11. A.M.	A violent shock			Ditto, 25 Messidor; Moniteur, 28 Messidor, An. 10; Cotte.
ig. 7. Caylus in the depart. Lot, France.	Ditto, lasting about 2 minutes.		The same day a loud explosive noise was heard at Cahors and for 40 leagues round it ("présidé d'une flamme dirigée de l'ouest à l'est, par un vent du sud, pendant 4 ou 5 minutes"). The ground moved like the waves of the sea. In one place a piece of ground of 100 feet long and 40 wide sank down, and a pool of water appeared in its stead. In another place the ground was raised. A boat on the Orinoco received such a shock that the rudder was broken.	Journ. des Débats, 30 Messidor et 2 Fructidor; Moniteur, 30 Messidor, An. 10; Cotte.
— 15. Cumana, on the north coast of S. America.	Three shocks at the hours mentioned, the last of which was less violent than the other two, and the second the most severe of the three.	The waters of the Orinoco rose so high as to leave a large part of the bed of the river dry.		v. Humboldt, Voyage, t. v. p. 5; Moniteur et Journ. des Débats, 3 Nivôse, An. 11; Allgemeine Zeitung, Nr. 354, s. 1432; Hamb. Correspond. Nr. 197; v. Moll's Annalen.
— 17. Ogegne, in the canton of Nivarreux, Lauveterre, and other adjoining places on the northern slope of the western Pyrenees.	A slight vibratory shock.		At La Rochelle accompanied by subterranean noise. In all probability the same shock with that at Ogegne, &c.	Palassou, Mém. &c. p. 276; Journ. des Débats, 10 Fructidor, et Moniteur, 12 Praet. An. 10.
(?) And at La Rochelle.	Ditto.			
— 18. Berne in Switzerland.	Several ditto			Hamb. Correspond. Nr. 143; Moniteur, 12 Fructidor, An. 10.
— 23. Richmond in Virginia.	A terrible shock		Attended with noise like the rolling of a carriage on pavement.	Moniteur, 26 Vendémiaire, An. 11.

1802. Aug. 29. St. John in Antigua ... — In Aug. ? Amboyne and other East Indian islands.	One shock ... A very violent earthquake.	..... The sea rose high upon the coasts, and did very great mischief.	..... No date is given, but the account is taken from letters of the 25th August.	Hamb. Corresp. Nr. 179. Hamb. Corresp. 1803, Nr. 4.
— Sept. 1. Naples	At Naples a slight vibration. In the neighbourhood of Capua the shock was more violent.	.....	For two days before smoke had issued from Vesuvius. At Naples there had been no rain, except on a single day, since March; the sky had been constantly clear, and the heat very great, especially on the 8th and 21st August, when it was almost unbearable.	Moniteur, 26 vendémiaire, an 11; Hamb. Corresp. Nr. 162; Cotte.
— 11. Strasburg..... A few minutes after 7 ^h 30 ^m A.M.	A rather violent shock from S.W. to N.E.	.....	.....	Journ. des Débats, 30 fructidor, 2 et 3 complémentaire, an 10, 1 et 2 vendémiaire, an 11; Moniteur, 2 compl. an 10 et 3 vendém. an 11; Hamb. Corresp. Nr. 155.
— 12. Ditto 6 ^h 36 ^m A.M.	Another shock, followed, an hour afterwards, by one of greater severity. Four more shocks, the first of which lasted more than a minute. Rather slight .....	.....	Accompanied by a violent wind from the south. The shock felt in the houses like the fall of a great weight.	Ditto.
— 13. Ditto	.....	.....	.....	Ditto.
— 15. Ditto 2 A.M.	.....	.....	.....	Ditto.
— 7 ^h 4 ^m A.M.	Violent motion .....	.....	Attended with subterranean noise	Ditto.
— A little before midnight.	More shocks, all from N. to S.	.....	.....	Ditto.
— 25. Kingston in Jamaica ...	A slight shock.....	.....	.....	Moniteur, 9 frimaire, an 11; Hamb. Corresp. Nr. 194.
— Oct. 1. Beauvais in France..... Between 9 and 10 P.M.	Ditto .....	.....	At the same time a globe of fire was observed, which moved from E. to W., and disappeared with a loud explosion, leaving behind a strong smell of sulphur, which remained a long time.	Journ. des Débats, 15 vendém. an 11.
— 23. Strasburg..... 7 ^h 30 ^m A.M.	Another shock	Ditto, 7 et 13 brum.; Moniteur, 11 brum. et 3 frim. an 11; Hamb. Corresp. Nr. 175, Beil.
— 24. Ditto	Another, rather violent.	Ditto.

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<p>et 26. Very widely extended. At Bucharest the motion was violent in a part of Transylvania, in Wallachia, and Moldavia. It was felt at Bucharest, to the S.W. at Krajowa and Wuldrin, to the S. at Ruzick, Varina, Constantinople, and the island of Ithaca but not anywhere. At 12^m War-i-t Con-ople moon</p>	<p>At Bucharest the motion was undulating, and continued for two minutes and a half. At 3³⁰ p.m. the same day, at 3 A.M. the following morning, and on the 28th, slight vibrations were again felt as they had before on the 25th. The shock was very violent in and around Cronstadt, where the direction was from E. to W. In Warsaw hanging bodies swung gently from S to N. At St. Petersburg the shock was very slight, and from S. to N.</p>	<p>At 6¹⁵ A.M. a violent shock in the vertical direction, lasting 40 seconds.</p>	<p>Many buildings were greatly injured in Bucharest, amongst others the Nicolai-kirche and its celestrial tower. The earth opened, and greenish water came forth which diffused an odour of sulphur through the whole city. Nothing remarkable had been observed in the atmosphere. The sky was overcast, the wind gentle and rather cool. In Pera (Constantinople) some houses were injured. The castle of Hidy near Cronstadt was destroyed. In Hermannstadt the churches were so shattered that the people scarcely dared to approach them. Several other places in this district suffered also. At Warsaw the sky was clear, the wind from the N.E., and the barometer stationary at 28 in. At Jassy and Czernowitz damage was done to buildings. On the right bank of the Oka the shock was very violent; on the left, it was not felt at all. At Moscow the walls were cracked, windows were broken, and cellars fell in.</p>	<p>Seezen's account in v. Zach's Monatl. Correspond. Bd. vii. p. 20; v. Moll's Annalen, Bd. ii. p. 453; Hamb. Correspond. 1803, Nr. 177, 183, 189, Bell; Montieur, 6, 14, 17, 18, 20, 21, 24 frim. et 13 nirsées, an 11; Journ. des Débats, 14, 18, 19, 21, 23 frim. et 12 nirsées.</p>
<p>Caermarthen in Wales Wienisch Neustadt tween 1 30. A.M.</p>	<p>lasted six seconds</p>	<p>Felt on board ships, fifty miles from land.</p>	<p>The greatest amount of damage was done at Rishik (south of Algiers) and its neighbourhood. A village of 200 houses was swallowed up.</p>	<p>Gentleman's Magazine, vol. lxviii. p. 1154. Hamb. Correspond. Nr. 197; Journ. des Débats, 30 frim. an 11.</p>
<p>In Transylvania and Wal-</p>	<p>Another severe earthquake.</p>	<p>The sea was slightly agitated.</p>	<p>The atmosphere was cloudy and warm.</p>	<p>Ditto.</p>
<p>On the southern coast of Spain, and again at Algiers.</p>	<p>Several shocks.</p>	<p>The sea was slightly agitated.</p>	<p>The atmosphere was cloudy and warm.</p>	<p>Ditto.</p>

1802. Nov. 8. Ditto In the morning.	.....	Ditto .....	.....	.....	Ditto.
— 11 ^h 30 ^m P.M.	Strasburg. Said to have been, like all the former shocks, quite local. It was, however, felt at Weissemburg.	Another shock, the most violent of all those felt this year.	.....	Produced cracks in some vaults	Journ. des Débats, 23, 24 brum. et 1 frim. an 11; Moniteur, 24 brum. et 3 frim.; Hamb. Corresp. Nr. 185.
— 22.	Coire and several other places in the Grisons.	A rather severe shock	.....	.....	Journ. des Débats, 4 nivôse, an 11; Hamb. Corresp. Nr. 206, Beil.
— 26. 1 P.M.	Constantinople, Galata, and Pera.	Violent vibrations for nearly two minutes.	The sea remained calm	The day was hot, and the wind from the north. Many houses were injured. Very probably only the event of October, incorrectly reported as to date.	v. Moll's Annalen, Bd. ii. S. 459.
— 27. 1 (or 2) A.M.	Autun in the department Saône et Loire. Also at Arnay in the depart. Côte-d'Or.	Several shocks.....	.....	.....	Journ. des Débats, 10 et 19 frim.; Hamb. Corresp. Nr. 197.
— Dec. 12.	In the district of Mont-Blanc.	Vibratory shocks.....	.....	.....	Kefenstein, Verzeichniss der Erdbeben, u.s.w. in Zeitung für Geognosie, Geologie, u.s.w. Weimar Jahrgang, 1827, St. iii. S. 326.
— 18.	In Swabia. Also in the Netherlands, especially at Rotterdam.	Ditto .....	.....	.....	Ditto.
— 18 to 23.	Sion in the Haut-Valais. Not felt in the Bas-Valais, even at St. Pierre but two leagues from Sion.	Frequent slight shocks. Recurred on the 25th and 26th.	.....	Some of the shocks of October and November had also been felt in this district.	v. Moll's Annalen, loc. cit. S. 460.
— 20.	Elbeuf in the depart. Seine-Inférieure.	A shock of eight seconds' duration.	.....	A violent storm occurred on the same day	Journ. des Débats, 6 nivôse; Hamb. Corresp. 1803, Nr. 3.
— Night between 23 and 24.	Mayence	A slight earthquake.....	.....	.....	Hamb. Corresp. Nr. 2.
— 31. 11 A.M.	Sisteron in the department Basses-Alpes.	A rather severe shock, which recurred at 2 P.M.	.....	The air was calm, the sky overcast, and the wind south. The barometer had been much agitated during the morning. The sun rose of a glowing red colour.	Journ. des Débats, 19 nivôse; Hamb. Corresp. Nr. 11.

2.	3.	4.	5.	6.
Unalashka, one of the Aleutian islands.	Very violent shocks during the year.			Langsdorff's Bemerkungen auf einer Reise um die Welt. Bd. ii. p. 209; Gilbert's Annalen der Physik, Bd. xlii. S. 217 u. 414.
Jan. 8. Bialystock in Poland ... A.M.	A violent shock, followed, at 4 and 5 A.M., by others, all apparently coming from the west. In the following night, at 11½ P.M., another shock was felt, and some inhabitants believed that there were still more afterwards.		The winter had been very mild, and in December but little snow had fallen. On the 2nd January, however, the temperature suddenly fell to -21 R., and yet two days afterwards a thaw set in. On the 6th the cold suddenly returned, and at the time of the first shock the thermometer stood at -25 R. By this shock buildings were shaken from their foundations. The next morning, in the city, a long and perfectly straight crack was observed in the frozen ground. Several other cracks were remarked on the morning after, and one in the wall of a strong public building. The cold became very great, and continued so for four days. During the whole period described there was very little wind, but on the evening of the last shock a pretty strong north wind blew, which, v. Hoff observes, extended widely over Europe, and appeared as a violent tempest at Trieste on the 11th.	v. Moll's Annalen, Bd. ii. p. 460; Journ. des Débats, 19 et 21 pluviôse; Monteur, 23 pluviôse, an 11.
— week of month.	Several shocks, more violent than those felt here in the preceding month.			Hamb. Corresp. Nr. 32, Beil. v. Moll's Annalen, loc. cit.
Feb. 2. Marseilles ... Feb. 11 and mid-	A rather violent shock		Some chimneys were thrown down. v. Hoff, quoting the Hamb. Corresp. and v. Moll, gives the date Feb. 3.	Journ. des Débats, 24 plur., an 11; Hamb. Corresp. Nr. 32; v. Moll's Annalen, loc. cit. p. 461.
Mar. 12. Guadeloupe ... — 17. Pointe-à-Pitre, Santa-Anna, and Maria Galante.	A severe earthquake. Thirteen shocks in the time mentioned, the first at 9½ 15 ^m .			Hamb. Corresp. Nr. 108.
Apr. 25. At Nîort, and in the department Deux-Sèvres.	A slight vibration			Ericks, Histoire des Voyages, quoted by M. Perrey in his memoir on the earthquakes of the Antilles.

Journ. des Débats, 15 plur., an 11.

1803. July. At Ancona the beginning of the month.	Shocks which were not sufficiently vio- lent to cause any damage.	.....	.....	Ditto, 14 therm.
— 24. Christians in Norway. 11 P.M. At Also felt at Laurwig. Laurwig 11 ^h 5 ^m .	A violent shock from E. to W.; at Laur- wig it was alight, and from N. to S.	.....	At Christiana the shock was preceded by a noise like thunder. At Laurwig it was <i>followed</i> by an aerial disturbance and noise. The electro- meter did not indicate any considerable amount of electricity in the air.	Moniteur, 9 fructidor, an 11; Keil- bau; Cotte.
— ...	On the banks of the Ganges, especially in the upper part, from the Jumna to the mountains from which it springs.	.....	The town of Barahat (Berahat or Badrinath), amongst others, suffered greatly from this event. Several villages were swallowed up.	Asiatic Researches, vol. xi.; Neue Allg. Geogr. Ephem. B. viii. S. 157.
— Aug. 15. Constantinople Between mid- night and 1 A.M.	Vibratory.....	.....	On this same night there rose an island in the Claveezer See near Plön in Holstein. It was about a thousand yards from the nearest point of land, in three fathoms water, and had a cir- cumference of about eighty feet, rising three or four feet above the surface of the water. The island consisted of the sand of the former bottom with fragments of turf. No earth- quake is mentioned at the place. The island was gradually washed away and disappeared. (Gilbert's Annalen, B. xvi. S. 384; Voigt's Magazin, B. vi. S. 260. u. B. vii. S. 364, &c.)	Moniteur, 16 vendém.; Journ. des Débats, 17 vendém. an 12.
— 16. Riom in Auvergne — 19. Constantinople — 25. In Spain and at several points on the coast of the Mediterranean.	Several shocks..... More shocks, appa- rently from N. to S. .....	.....	.....	Cotte. Moniteur and Journ. des Débats, <i>loc. cit.</i> Mém. de Chronol. t. ii. p. 932.
Oct. 8. Gordes in the depart. Between 6 Vacluse, France. and 7 P.M.	Some persons <i>believed</i> they felt an earth- quake. Several shocks .....	.....	An aërolite fell at Apt on the same day between 10 and 11 A.M.	Moniteur, 2 frim. an 12.
— 13. Palermo — 14. Tiflis — 17. Tiflis (O.S.)	..... An earthquake .....	.....	..... Walls were cracked by the shock	Poggendorff's Annalen, Bd. xxiv. S. 54. Dubois de Montpéroux, Voy. autour du Caucase, t. iii. p. 271.

	2.	3.	4.	5.	6.
Oct. 17.	S. Philippe and Benig- nus in the kingdom of Valencia, Spain.	A rather violent vibra- tion.		No damage ensued.	Moniteur, 19 frim. an 12.
Nov. 9 O.	Palermo and Messina . . .	Severe shocks, in the direction from E. to W.		Etas remained undisturbed . . .	Poggendorf's Annalen, loc. cit.; Hamb. Corresp. 1803, Nr. 202; Journ. des Débats, 27 frim.; Mo- niteur, 28 frim. an 12.
Dec. 12. P.M.	Chamouni	Violent, and in the direction S. to N.		Mont Blanc was violently shaken, and a mass of ice of 100 feet in height fell from it. Soon after the mountains of Breven suffered the same concussions, and great masses of rock were detached and rolled into the valleys below.	v. Moll's Neue Jahrbucher d. Berg- u. Hüttenkunde, Bd. ii. S. 309.
— 13.	Along the Lower Meuse, An especially in Vlaar- dingen, Maasland, Rotterdam, and Schie- dam.	An earthquake con- sisting of slight oscillations.	Also perceived on board ship by the unusual disturb- ance of the water.		Ditto; Hamb. Corresp. 1804, Nr. 13.
— 28. A.M.	Nantes, and Antwerp . . .	Some people at each of these places be- lieved that they had felt a shock.		During a tremendous storm which raged also at Paris and Rouen. An igneous meteor was observed.	Moniteur, 11 et 13 nivôse, an 12; Hamb. Corresp. loc. cit.
—	In the district of Kemson at the foot of the Hu- malayas, and in the neighbouring pro- vinces.	Very violent		Many buildings were ruined. Possibly the same with the event of July. In this year also there was a violent eruption of Waurai in Hawaii Sandwich Isles.	Berliner Sparsache Zeitung, 1837, No. 59; Edinburgh Journal of Science, vol. vi. p. 371.
Jan. 13. P.M.	Madrid and Aranjuez. Also felt at the same time at Malaga.	At Malaga a violent vibration from N. to S., lasting 55 sec.; more violent at Aranjuez than at Madrid.			Hamb. Corresp. Nra. 22 u. 25; Journ. des Débats, 15 et 29 plu- viôse; Moniteur, 30 pluviôse, an 12.
—	Rotterdam and the neigh- bourhood; and at the Hague and Bois-le- Duc.	A shock which was violent at the Hague and Bois-le-Duc.	Felt also at sea		Journ. des Débats, 1 pluviôse; Moni- teur, 3 et 5 pluviôse, an 12.
—	Malaga. Also very de- structive at Velez, five miles from Malaga.	Several shocks. That at 5 A.M. was very violent in the direc-		Accompanied at 5 A.M. (4 th 55 th according to v. Hoff) by noise. The atmosphere was ob- scured and hot.	Journ. des Débats, 13 ventôse; Mo- niteur, 14 ventôse, an 12; Hamb. Corresp. loc. cit.

night, 3 and 5 A.M.	and in Murcia.	tion N. to E. (sic), and the motion lasted nearly a minute.	.....	In one of the churches the chandeliers swung more than two feet from the perpendicular.	Gentleman's Magazine, vol. lxxiv. p. 267.
1804. Jan.	Rotterdam, Haarlem, &c.	W. to E. ....	.....	.....	Voigt's Magazin, Bd. viii. p. 72.
End of the month.		Shocks .....	.....	.....	Moniteur, 23 ventôse; Journ. des Débats, 24 ventôse.
— Feb. 3. 1 A.M.	Departm. Mont Blanc....	The shocks continued from the time of those at Malaga up to this date, one or two being felt each day. That of the 6th here given was the most violent. Its direction was supposed to be W. to E. The shocks recurred at intervals of (within a few minutes) three hours, and always lasted four minutes.	These shocks extended to sea.	.....	.....
— 6. 1 A.M.	Motril in the kingdom of Grenada.	At Palermo one shock. At Etna a perceptible vibration.	.....	.....	Ann. de Chim. et de Phys. t. xxi. p. 400; Poggendorff's Annalen, loc. cit.
— 9.	Palermo; and, the same day, near Mt. Etna.	Vibratory.....	.....	.....	v. Hoff.
— 15.	St. Petersburg.....	A rather severe shock, lasting 2 or 3 secs.	.....	.....	Moniteur, 23 ventôse; v. Hoff.
— 16.	Motril in Grenada. Also this day at Malaga.	At both Motril and Malaga numerous shocks during the day.	.....	.....	.....
A little after 6 A.M.		Shocks.....	.....	On the 24th of this month a great storm of thunder and lightning raged over nearly all Germany, the whole of the Netherlands, and even as far as Moscow, accompanied by snow, and did much damage to buildings in various places.	v. Hoff; Hamb. Corresp. Nr. 37 u. 65.

1.	2.	3.	4.	5.	6.
Feb. — St. Servan in France	Shocks				v. Hoff.
Mar. 1. Malaga, and Mouri in Grenada.	Repeated shocks.				Ditto.
— 2. Moustier in the departm.	Several shocks.				Journ. des Débats, 28 ventôse.
4. — Mont Blanc.					Ditto; Hamb. Corresp. Nr. 50.
— La Flotte in the departm.	A slight shock from S E to N.W.				Accompanied by a rather loud subterranean noise. The Journ. des Débats adds that shocks had been felt in the Alps, and in different parts of Europe and Africa. Perhaps some of the shocks reported at Malaga extended to the opposite continent. The Hamb. Corresp. gives the date of the event at La Flotte March 5—6.
— Charente-Inférieure.					Hamb. Corresp. Nr. 157.
May 5. Malta	One shock				Journ. des Débats, 28 prairial;
— 11. Florence	Ditto				v. Hoff.
— 13. Ditto	Ditto				Ditto.
— 17. Ditto	Ditto				Ditto.
— 18. Virginia and New York	Vibratory shocks.				v. Hoff.
— 26. Malta	Another shock				Hamb. Corresp. Nr. 157.
June 8. St. Maura, Zante, in the Two	very severe shocks, followed by a third at 3 A.M.				Journ. des Débats, 10 thermidor;
after Morea, at Patras. Most					Moniteur, 11 thermidor; Hamb.
light of violent at Patras.					Corresp. Nr. 121.
th.					
	The ships in the bay.				
	The third shock overthrew many houses in the Morea, especially at Patras. It is said that shocks were common this year in the two islands in question, more than 100 having been felt in 1½ year, of which, however, but four or five were violent; and that one had been felt here thirteen years before. Preceded, on the present occasion, by a perfect calm, great heat, and a terrible noise lasting two seconds.				
— 13. Klagenfurth in Carinthia	Three shocks at the hours mentioned, the last being the most violent.				Journ. des Débats, 21 messidor;
7 ^h 5 ^m — 50 ^m	Several shocks				Moniteur, 22 messidor.
— 14. Baudissau (Badissau in Silesia) and several other points in Prussia.					There suddenly appeared on several of the mountains springs which had never been seen before. From the 15th to the 20th June the

1804. July 28.	Spoleto and as far as Nocera.	Violent shocks, especially the first ones. They recurred frequently up to the 26th August, and on the 25th September, the day of the eruption of Vesuvius, the earth in the vicinity of the crater trembled violently.	.....	Elbe and neighbouring rivers inundated their banks, and it was supposed that an earthquake was felt at Dresden.	Journ. des Débats, 14, 20, 23 fruct.; Moniteur, 15, 21, 28 fruct. an 12. et 3 brum. an 13; v. Hoff; Hamb. Corresp. Nrs. 137, 147, 181, Beil.
— Aug. 7. (O.S.?)	Tiflis in Georgia	A slight shock.....	.....	.....	.....
— Night between 11 and 12.	Ditto	Ditto .....	.....	.....	Dubois de Montpéroux, Voyage autour du Caucase, t. iii. pp. 271-274. Ditto.
— 16.	In Auvergne	Vibratory shocks.....	.....	.....	v. Hoff.
— 20.	Malaga and Madrid ...	Ditto .....	.....	.....	Cotte.
— 22 to 25.	In the kingdom of Granada, especially at Albugnol.	.....	.....	.....	Moniteur, 24 fruct. an 12, 14 et 29 vendém. et 4 brum. an 13; Journ. des Débats, 11, 13, 21, 28 vendém. an 13.
— 25. Beginning at 8 ^h 30 ^m A.M.	Almeria in Grenada, and the surrounding district. Also at Madrid, Malaga, and Carthage. "The region shaken was parallel to the line of the Sierra Nevada, and consequently to the axis of the Mediterranean basin."—v. Hoff.	Within three-quarters of an hour, three terrible shocks and many slighter ones were felt at Almeria. At Albugnol five very violent shocks. The direction was S. to N.	The Salinas of the Bay of Rochetta were submerged, and much salt destroyed. Near Albugnol the sea remained quite calm.	Commenced with a low subterranean noise. Houses fell or were much injured. Rochetta was for the most part ruined. Castel del Popolo, Bella Villa della Palma, and Eniz were also destroyed. In Dalias men were buried beneath the ruins, and in Feliz a bell fell from the church tower. At Albugnol the heavens were obscured by a dark mist, which resolved itself into a cloud, whence, in ten minutes, five terrible flashes of fire (lightning?) issued, and after each flash a shock took place. A strong wind dispersed the clouds, and intense heat set in, which lasted until the 28th, as did also the shock. A mountain in the neighbourhood	Ditto; Hamb. Corresp. Nrs. 144, 157, 169; v. Moll's Annalen, Bd. v. S. 326.

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2.	3.	4.	5.	6.
Aug. 25. In the Netherlands; at Schiedam at the hour mentioned.			was cleft, and from the opening a stream of water poured out upon the lower parts of the town. Springs disappeared in some places, and new ones burst forth in others. Rivers were dammed up and changed their course.	Ditto.
— 30. St. Ann's Bay, Jamaica.	A single violent shock from N to S, lasting four seconds.		Preceded by a perfect calm; the air close and almost irrespirable. Thermometer at 85°. Birds and other animals showed decided signs of fear.	Tilloch's Philosophical Magazine, vol. xx. p. 184. Ditto, vol. xi. p. 281.
Sept. 16. In Grenada, especially at the city of Grenada.	Several severe shocks.		Grenada suffered considerable injury	v. Moll's Annalen, Bd. v. S. 328.
— 21. Jersey in Moldavia	Several shocks.			Hamb. Correspond. Nr. 179, Beil.
— 23. St. Malo (Ille et Vilaine).	At St Malo a severe shock, followed at 3 ^h 13 ^m by a second of less violence.	This same day a terrible tempest extended over the German Ocean.	Accompanied at St. Malo by a noise like the rumbling of carriages on a wooden bridge. Some people were made sick by the motion, and dogs bayed.	Journ. des Débats, 8 et 9 vendém.; Moniteur, 9 et 10 vendém. et 3 brum. an 13; Hamb. Correspond. Nrs. 162, 166; Cotte; v. Moll's Annalen, Bd. v. S. 328.
— 24. In the kingdom of Greece.	The motion was from N.E. to S.W. and lasted 10 to 12 seconds. At the other places mentioned it was from E. to W., and lasted about 43 sec.		At the end of this month Venetians threw forth some lava again.	
— 25. In the kingdom of Greece.	A slight shock.			Dubois de Montpéroux, loc. cit.
— 26. Ditto	A severe one		The day had been rather cloudy but agreeable. The following night first white frost was observed.	Ditto.
— 27. In the kingdom of Greece.	The shocks recurred on this day.			v. Moll's Annalen, Bd. v. S. 328.
— 28. Tiflis	An earthquake less violent than the last.		The day had been very fine	Dubois de Montpéroux, loc. cit.

1804. Sept. 26. Tiflis 2 A.M.	.....	Another shock, a little more severe.	.....	.....	Dubois de Montpéroux, <i>loc. cit.</i>
— 29. Ditto 11 A.M.	.....	A <i>feeble</i> vibration, which is yet after- wards said to have been infinitely more severe than that of the 23rd. During the night there were four slighter shocks, in the intervals of which a slight mo- tion of the earth was perceived.	.....	Several walls fell. The day had been stormy, and the night rainy. The Moniteur (19 nivôse, an 13.) only men- tions shocks on the days following:—24th at 8 ^h 35 ^m P.M.; 25th at 9 ^h 10 ^m P.M.; 26th at 1 ^h 25 ^m , and 29th at 8 ^h 40 ^m and 10 ^h P.M. None of these probably are separate events from those recorded in this catalogue, and seem less likely to be accurate as to date.	Ditto.
— 30. Ditto 4 and 8 A.M. and 2 and 10 P.M.	.....	Four slight shocks at the hours mention- ed.	.....	.....	Ditto.
— Oct. 1. Ditto After mid- night, and	.....	Another shock	.....	.....	Ditto.
— Between 6 and 9 P.M.	.....	Three shocks	.....	.....	Ditto.
— 2. Ditto 3 A.M.	.....	A slight shock.....	.....	The days were now very cold and rainy	Ditto.
— 5. In Tuscany, in the valley of Elsa, particularly at Colle, Poggibonsi, and S. Gemignano.	.....	Ditto. There were several others in the course of the month.	.....	.....	Pilla, Istoria del tremuoto, &c.
— 6. Tiflis	.....	Another shock.....	.....	.....	Dubois de Montpéroux, <i>loc. cit.</i>
— 7. Ditto 10 P.M.	.....	Another, very severe.	.....	.....	Ditto.
— After mid- night.	.....	A slight vibration	.....	.....	Ditto.
— Night be- tween 10 and 11.	.....	Very violent	.....	The inhabitants of several villages were obliged to sleep in the open fields.	Moniteur, 20 brum. an 13; Moll's Annalen, Bd. v. S. 328.
— 14. Sienna and the neigh- bourhood.	.....	.....	.....	.....	.....

	2.	3.	4.	5.	6.
Oct. 16. Tiflis		Renewed shocks			Dubois de Montpérèux, <i>loc. cit.</i>
— 17. Ditto		Another shock		The 15th was a very warm day; in the evening there was a violent storm with sudden gusts of wind. This continued on the 16th and 17th. The 18th was rainy and cold. From the evening of the 20th up to midnight of the 21st the rain was very heavy, after which there came a terrible tempest lasting till noon next day. Accompanied and followed by <i>rombi</i> or dull aerial noises. Some damage was done in this district, and the inhabitants had to quit their houses.	Ditto.
— 18. In Tuscany, in the valley of Elsa, and the places mentioned together above.		The most severe of all the shocks felt this month.			Pilla, <i>loc. cit.</i>
— 20. Siena and its neighbourhood.		Very violent			Moniteur and v. Moll, <i>loc. cit.</i>
— 22. Tiflis		Some slight shocks..		During a storm	Dubois de Montpérèux, <i>loc. cit.</i>
— 23. In the island of Jersey, and at St. Malo, and several French sea-ports.		Renewed shocks		Perhaps only a mistaken account of the event of Sept. 23.	
Nov. 6. Tiflis		A violent vibration...		On the morning of the 7th the first snow fell ...	Dubois de Montpérèux, <i>loc. cit.</i>
— 14. Region about Veuvinus		A violent shock		The volcano had been pretty quiet for some weeks, but immediately after this shock it burst forth into eruption. On the 24th the stream of lava had sensibly diminished.	Hamb. Corresp. Nr. 207, Beil.
— 30. Tiflis		Three shocks, of which one was violent.		Much snow fell during the night	Dubois de Montpérèux, <i>loc. cit.</i>
Dec. 14. Leghorn		One shock		Caused no damage	Hamb. Corresp. 1808, Nr. 3.
— 17. Valley of Elaa in Tus-cany, and the other places mentioned together above.		Another severe shock. The undulations appeared to come from the S.W.			Pilla, <i>loc. cit.</i>
— 18. Leghorn		Two slight shocks, the first more considerable than the second.			Journ. des Débats, 13 Nivôse; Moniteur, 1 Pluviôse, an. 13.

12. Vale of Clwyd in North Wales.	A third was suspected about 4 P.M. Lasted two or three seconds.			Gentleman's Magazine, vol. lxxv. p. 173.
11. Leghorn.	Vibratory.			
11. Vitré (Ille et Vilaine).	One shock; several however, were felt at other places near.			7. Moll's Annalen, Bd. v. S. 338.
— Sigmaringen in Swabia.	One shock.			Journ. des Débats, 4 Ventôse; Moniteur, 5 Ventôse, an 13; Cotte.
21. Triflis in Georgia.	An earthquake, lasting nearly half a minute, and consisting rather of oscillations (<i>déplacements</i>) than of actual shocks. Followed by slight shocks at 5:30 ^m A.M., and another slight one at 10 P.M.			Cotte.
21. Innsbruck.	A violent shock.			Dubois de Montpéroux, <i>loc. cit.</i>
— In England.	Vibratory shocks.			
9. Strasbourg, Büschweiler, and Haguenau.	A slight vibratory shock.		Here and there cracks were produced in the walls.	Hamb. Corresp. Nr. 59, Beil.
10. Tönnungen in Jeddah.	An earthquake shock was supposed to have been felt.			v. Hoff.
16. Again at Büschweiler, Haguenau, and the surrounding district.	Vibratory, in the direction of the course of the river Moder.			Hamb. Corresp. Nr. 85.
21. In Kamtschatka.	Shocks during a minute.			Ditto, Nr. 77, Beil.
30. Ditto.	Renewed shocks, more violent than the former, and lasting several minutes.			Ditto, Nr. 85.
3. Island of Candia. Also felt in Sicily.	An earthquake consisting of four severe shocks in the space of 8 minutes.			Ditto, Nr. 146; Moniteur, 21 Sept. 1806.
			The bells sounded of themselves.	Ditto.
			The towns of Casena and Retimo suffered most damage.	Hamb. Corresp. Nr. 147; v. Moll's Annalen, Bd. vi. S. 338; Cotte; Kefertan; Moniteur, 18 Fruct. an. 13.

See wig.

1.	2.	3.	4.	5.	6.
July 3. About Etna.....				Perhaps the shocks in Sicily mentioned by Cotte and Kéferstein as contemporaneous with those in Candia, are the same with the earthquake here given.	Ann. de Chim. et de Phys. t. xxi. p. 400.
— 24. Eisenartz in Styria..... 6 ^h 37 ^m 0 ^h 10 ^m	Eisenartz in Styria.....	Three vertical shocks at the hours mentioned, without oscillation.		The air was calm and close. At noon rain began, which lasted all the following night.	Moniteur. 2-8 and 12 Fruct. an 13; Journ. des Débats. 4 Fruct.; Hamb. Corresp. Nr. 131; Cotte.
— 26. Rome..... 5 A.M.	Rome.....	Slight shocks. The motion appeared to come from the Apennines.			Journ. des Débats. 28-30 Thermidor, 7, 8, 11, 21, 23 Fructidor, an 13; 3, 11 Vendém. an 14; Moniteur, 27 Thermidor, 3, 4, 12, 16, 18, 24, 29 Fructidor. 1 complén. an 13; 11 Vendém. an 14; Bibl. Brit. t. xxix. p. 389, et t. xxx. p. 239; Journ. de Phys. t. lxi. p. 225; v. Buch, Canar. Inseln, S. 333; v. Moll's Annalen, Bd. vi. S. 538; Hamb. Corresp. Nr. 135, 136, 137, 140.
— 7 ^m , 11 ^m and 7 ^m after night.	Naples, and throughout La Puglia, Calabria, and the Terra-di-Lavoro. Most violent in the province of Molise, and extending even to Rome.	A most destructive earthquake. At Naples three shocks at the hours mentioned. The first lasted 45 to 50 seconds, with increasing intensity, in this direction N. to S. The second shock was less violent, and the third still less so. Three more shocks were felt during the three following days. According to other accounts, the first shock at Naples consisted of several di-	About 10 P.M. the sea at Naples was agitated, small eddies or whirlpools were observed at the surface, and a person bathing felt the sand move beneath his feet, and saw a shoal of fish swimming on the surface of the water.	The heat at Naples was most oppressive. At 7 in the morning there had been a storm from the N.W., and at 8 ^h 30 ^m in the evening a cool breeze from the N. blew for an hour. The heavens were clear, but a slight mist covered the surface of the ground. The barometer stood at 29.9 inches. Some buildings in Naples were injured, and a few fell. In La Puglia and Calabria these shocks were but slightly felt, but to the north of Naples they were very violent. In the Terra-di-Lavoro, Averara, Caserta, and Caserta were most injured. In Molise the town of Isernia became a heap of ruins. Avellino, Benevento, and Iojano in Capitanata suffered greatly. On the east of the Apennines, Campobasso, S. Agatha, Aquila and Chieti experienced some damage, the last being the most northern place where the earthquake seems to have been sensible.	Ditto.

distinct blows, separated by undulatory motion, and lasting altogether 68 sec.		At Foggia also some damage was done. Soon after the shocks, the water of a spring on the mountain of Cassino became sulphureous. At Bojano a lake appeared. Vesuvius merely sent forth smoke during this earthquake, but after the second shock a double explosion as of cannon was heard from the mountain. In this month Etna burst into eruption.	
26. Some of the Antilles, especially Antigua.	Several shocks	Ancigua suffered most from these shocks	Hamb. Corresp. Nr. 156.
31. East Haddam, Connecticut.	Two slight shocks	Preceded by a thunderstorm at 4 p.m.	Silliman's Journal, vol. xxix. p. 339.
32. Around Vesuvius.	Some slight shocks	Followed, the next day, by an eruption of extreme violence. The lava especially was of most unusual fluidity, and traversed a space of 26,000 Neapolitan palms (= 22,360 Engl. feet) in five hours.	v. Such, Geogr. Beobacht. auf Reisen, u. a. w. Th. ii. S. 218.
34. In the province of Molise, kingdom of Naples.	One shock		Journ. des Débats, 3 Vendém.; Moniteur, 7 et 11 Vendém. an 14.
38. Ditto	Ditto		Ditto.
39. Island of Oleron	Two shocks at the hours mentioned.		Journ. des Débats, 4 et 5 complém. an 13; Cote.
39. Eger (in Bohemia?)	Vibratory		Cote.
39. Naples and the neighbouring country.		At Capua and Nola several buildings fell. On the 15th Vesuvius was in eruption.	Journ. des Débats, 14 Frum.; Moniteur, 15 Frum. an 14.
At Constantinople	An earthquake	Accompanied by an epidemic	Moniteur, 18 Février, 1806.
39. Cote in the Grisons	Several shocks		Journ. des Débats, 2, et Moniteur, 3 Nivôse, an 14; Cote.
26. In the district of Bulte near Hanover.	A vibratory shock	Accompanied by a loud explosive noise	Hamb. Corresp. 1806, Nr. 2.
30. East Haddam, Connecticut.	A slight shock		Silliman's Journal, vol. xxix. p. 339.
In the Morea	An earthquake		v. Hoff.
Sta Fé di Bogota in Colombia.	A violent earthquake.	From this year until 1807 there were repeated eruptions of the volcano of Icalco in Guatemala. (Annalen der Physik, Bd. lxxvii. S. 539.)	Allgemeine Zeitung, 1826, Nr. 260, Bell, S. 1042.

	2.	3.	4.	5.	6.
no. 20. Oregon in the department of Bouches-du-Rhône.	Two shocks in 20 seconds, the first of which was much more violent than the second.	.....	.....	Accompanied by a dull noise, like the explosion of cannon, at each shock. Cotte gives the date Jan. 19.	Journ. de l'Empire, 20 Févr.; Cotte.
— between ad 24. Poitiers	Two very severe shocks, the second less so than the first Direction S. to N.	.....	.....	Both accompanied by a dull and prolonged sound.	Journ. de l'Empire et Montieur, 13 Févr.; Cotte.
Mar. 2. Novellara in Italy	Rather violent shocks.	.....	.....	.....	Cotte in Journ. de Physique, t. lxxv. Montieur, 6 Mai; Journ. des Débats, 7 et 26 Mai, Cotte.
10. May 1. Barbadoes	An earthquake .....	.....	.....	.....	Cotte, loc. cit.
— 27. At Etua	A slight shock .....	.....	.....	The eruption which occurred this day was preceded by the shock. It perhaps occurred a day or two before.	Ann. de Chim. et de Phys. t. xxi. p. 400. Montieur, 26 Juin.
— 31. Vesuvius	A severe shock .....	.....	.....	The houses were much shaken	Journ. des Débats, 6 Juillet; Cotte.
une 19. Nice .....	.....	.....	.....	.....	.....
en 11 ad mid. .....	.....	.....	.....	.....	.....
July 21. In the kingdom of Naples	At Naples the shock was slight, but more severe at Molise and Sorà.	.....	.....	.....	Journ. des Débats et Montieur, 11 et 14 Août, 25 Févr. suiv.; Cotte.
— 26. Ditto	Another shock .....	.....	.....	.....	Ditto.
Aug. 8. Krasnojarsk in Siberia	A terrible shock, lasting 4 min. 15 sec.; followed by a second a little later.	The river Jenissei inundated its banks.	.....	A violent storm intervened between the two shocks. A mountain at the distance of 12 wersta from Krasnojarsk was replaced by a lake of 300 feet in circumference and 180 feet in depth in some places, the water in which had the taste and smell of sulphur. The country was covered with volcanic ashes.	Montieur, 26 Oct.; Journ. des Débats, 3 Déc.
— 26 to 30. Rome and its neighbourhood, extending as far as Naples. The centre of disturbance appeared to be the mountain of La Fajola.	Violent shocks, constituting the most terrible earthquakes which Rome had experienced since 1703.	.....	.....	Caused great damage. One shock was so violent that the senator Lucien was thrown out of his bed. At the mountain of La Fajola a lake of sulphurous water was formed.	Journ. des Débats, 15 et 25 Sept.; Montieur, 16 et 26 Sept.; Cotte.

1806. Sept. 22. 8 ^h 45 ^m P.M.	Presburg, Pesth, and Buda, Hungary. Also felt at Komarom (Komorn?).	Two shocks .....	.....	The weather was calm	Journ. des Débats, 12 et 15 Oct.; Moniteur, 12 Oct.; Cotte.
— Oct. 6.	Gerace in Calabria Ultra.	A severe shock .....	.....	.....	Moniteur, 14 Nov.
— — 10.	At Etna	An earthquake .....	.....	.....	Ann. de Chim. et de Phys. t. xxi. p. 400.
— Nov. 1 to 18.	Grenada in Spain	Violent shocks.....	.....	Several houses were injured; and a village was ruined, and replaced, it was said, by a new river.	Moniteur; 1-4 Déc.; Cotte.
— — 28.	Komarom (Komorn?) in Hungary.	Another earthquake .....	.....	.....	Férussac, Bull. des Sciences Naturelles, t. xviii. p. 195.
— Dec. 12.	Bâle .....	.....	.....	.....	Mérian.
— — 17. 10 ^h 43 ^m P.M.	Ulm	A violent vertical shock, lasting three seconds.	.....	The weather was calm	Journ. des Débats, 27 Déc.; Moniteur, 28 Déc.
— —	Bitonto and Trani in the kingdom of Naples.	A violent shock from S. to N.	.....	.....	Journ. des Débats, 11 Janv.; Moniteur, 12 Janv. 1807; Cotte.
— Night between 18 and 19.	Throughout the Terra-di-Bari, kingdom of Naples.	Several severe shocks.	.....	.....	Journ. des Débats, 21 Janv. 1807; Cotte.
— — At the end of the year.	At the Blesle and Ardles in the departm. Haute-Loire.	A slight shock.....	.....	.....	Moniteur, 19 Févr. 1808.
1807. Jan. Night between 14 and 15.	Pau in the Pyrenees ...	Three rather violent shocks.	.....	.....	Journ. des Débats, 25 et 31 Janv.; Moniteur, 31 Janv., 5 et 19 Févr.
— — 15.	Bayonne and the environs.	A shock in the direction S.W. to N.E. At Sarrance there were five shocks.	.....	.....	Ditto.
— Night of 27 and 28.	In the territory of Molise, kingdom of Naples.	A shock of four seconds; nearly as violent as that of the 26th July preceding.	.....	.....	Moniteur, 25 Févr.
Feb. 19 and 20. (At night?)	Darmstadt .....	.....	.....	.....	A catalogue communicated to M. Perrey by M. Studer, Professor of Geology in the University of Berne.
— — 24.	At Etna	Another shock of earthquake.	.....	.....	Ann. de Chim. et de Phys. loc. cit.

1.	2.	3.	4.	5.	6.
Feb.	Cahors in the departm. of Lot.	A shock from the S.E., but slightly felt.		Probably the same as that of Feb. 8, 1808	Delpont, <i>Statistiques du Lot</i> , t. 1. p. 108.
—	Janina in Epirus	One earthquake shock during this month.		M. Pouquerille says that this country (Epirus) is perhaps the district of Europe in which earthquakes are most frequent. The shocks, according to him, do not extend more than 20 leagues from the sea, and are stopped at the foot of Mount Pinus, so that they are never felt in the Polyanos, at Calarites, at Syraco, or in the higher regions where the rivers take their rise.	M. Pouquerille in <i>Ann. de Chim. et de Phys.</i> t. xiii. p. 408.
Mar. 30.	In the northern part of the Puy-de-Dôme.	A severe shock, extending over a surface of about 4 myriamètres in length.		Some old ruins were thrown down, and clocks were stopped.	<i>Journ. des Débats</i> , 30 Avril; <i>Moniteur</i> , 1 Mai.
—	Janina in Epirus	On four days during the month shocks occurred.			Pouquerille, <i>loc. cit.</i>
April.	Ditto	Five days in this month were marked by shocks.			Ditto.
May.	Ditto	Shocks on four days.			Ditto.
June 6.	Lisbon. Also at Oporto, and in other parts of Portugal.	A violent shock, said to be comparable to the great one of 1755, and followed immediately by a second. Duration = 10 or 12 seconds. The motion was horizontal and vertical, but badly observed.	The sea remained calm. The shock was felt on board a frigate 8 leagues off the Rock of Lisbon.	No disasters ensued from this earthquake. The Annual Register gives the date 6th July, and says that several houses were thrown down.	<i>Journ. des Débats</i> , 28 et 30 Juin; <i>Moniteur</i> , 29 Juin; <i>Annual Register</i> , vol. i. p. 174.
—	17. Reglau in the canton of Zurich.	An earthquake			M. Studer's catalogue quoted above.
July 14.	Lahr or Lohr in Swabia.	A rather violent shock.		Some of the buildings rocked violently	<i>Journ. des Débats</i> , Juillet 30; et <i>Moniteur</i> , 31 Juillet.
August.	Janina in Epirus	One shock during the month.			Pouquerille, <i>Ann. cit.</i>

1807. Sept. 5. Genoa, Nice, and the country for six leagues round. (At Coni, 1 ^h 30 ^m .)	A slight shock .....	.....	.....	Journ. des Débats, 15 Sept.; Moniteur, 16 et 30 Sept.
11. Neuwied on the Rhine.. 8 ^h 30 ^m P.M., midnight, and 3 the next morning.	The first of the three shocks felt was violent, horizontal, and in the direction S.W. to N.W.(?) The two others were slighter, the third being the least violent of all. Shocks on two days of this month. Some slight earthquake shocks. A violent shock, followed by others each night up to the 26th. Another vibration	The Rhine was agitated, and fish leaped out of the water.	The first shock was scarcely felt in houses situated on the north side of a street, while those on the other rocked violently; accompanied by a noise like that of a carriage rolling rapidly on pavement. Immediately after, the wind ceased, and the sky became overcast with clouds.	Journ. des Débats, 27 Sept.; Moniteur, 28 Sept. et 9 Oct.; Gentleman's Magazine, vol. lxxvii. p. 964.
Janina in Epirus	Shocks on two days of this month.	.....	.....	M. Pouqueville, <i>loc. cit.</i>
Oct. 1. Vienna..... 2 A.M.	Some slight earthquake shocks.	.....	Accompanied by a terrible tempest	Moniteur, 16 Oct.
Nov. 18. Algiers.....	A violent shock, followed by others each night up to the 26th.	.....	Buildings were thrown down	Journal de l'Empire (same with Journ. des Débats), 22 Févr.; Moniteur, 21 Févr. et 15 Mars, 1808.
25. At Etna	Another vibration .....	.....	.....	Ann. de Chim. et de Phys. <i>loc. cit.</i>
Dec. 19. Bielle, and in the mountains of Oropa, Lombardy.	A rather violent shock from N.E. to S.W.	.....	At Ivree the shock was most strongly felt in the lower parts of the town and near the river. Doors were thrown open, and pictures fell to the ground.	Vassali-Bandi, <i>loc. cit.</i> pp. 64 et 131.
22. Dusseldorf and its environs. 3 A.M.	Two shocks .....	.....	Preceded by a noise like that of a great number of carriages rolling over pavement. The weather was calm and hazy.	Journ. des Débats et Moniteur, 1 Janv. 1808.
Weston, Connecticut .....	.....	.....	Accompanied by a remarkable meteor	Silliman's Journal, vol. xxxix. p. 336.
1808. Jan. 8. Dunnichen in Scotland.	Several shocks .....	.....	.....	Mém. de Chronol. t. ii. p. 932.
Feb. 8. Brioude in the department Haute-Loire. Also felt at Cahors, Nîmes, Montpellier, Saumur, and slightly at Bleau and Ardes.	A shock in the direction N. to S., followed, a few minutes afterwards, by another of less violence. At Cahors the motion was rather violent, and lasted two or three seconds.	The first shock was accompanied by a disturbance of the air like that caused by a cannon-shot. Several people suffered from a violent headache in consequence.	Journ. des Débats, 16, 19, 20 et 21 Févr.; Moniteur, 19 Févr.; Traux de l'Acad. du Gard. An. 1808, p. 180.	

1.	2.	3.	4.	5.	6.
Feb. 27. Semlin and Belgrade .. ds mid.		Three rather violent shocks.			Journ. des Débats, 29 Mars; Moni- teur, 30 Mars.
—	Janina in Epirus	One shock during the month.			Ponqueville, <i>loc. cit.</i>
Mar. 4. Ile Dieu (off the coast of Poitou).	A violent shock, last- ing 14 seconds.	A violent shock		Two enormous masses of rock fell into the sea ..	Journ. des Débats et Moniteur, 28 et 29 Mars.
— 27. Strasbourg	A violent shock			A strong wind was blowing	Moniteur, 1 Avril; Journ. des Dé- bats, 2 Avril; Studer.
3 rd A.M.					
April 2. In Piedmont, through- out the valleys of the Po, Palice and Clusone, and as far east as Mi- lan; extending over almost the whole val- ley of the Rhone, as far as Montbrison and Berne. The centre of disturbance seems to have been at Pignerol.	More violent in Pied- mont than further N. and W. The directions given are N.W. to S.E. at Turin, N.E. to S.W. at Nice, S. to N. at Chambéry, N. to S. at Grenoble, S.S.W. to N.N.E. at Gap, and E. to W. at Briançon and Mar- seilles. At Cham- béry the duration of the motion was estimated at 10 to 15 seconds, at Gre- noble about 40 sec., at Gap 30 sec., at Marseilles 3 shocks in 19 sec. (the first was the slightest, and lasted 4 sec.; an interval of 2 sec. then elapsed, fol- lowed by the second shock, of 8 sec. duration; then an- other interval of 2 sec.; and finally the	At Marseilles it was said that the water in the canal of the arsenal experienced a triple flux and re- flux, so that the water rose about 6 inches above the mean level of the sea.	This very severe shock, the first of the many felt in Piedmont during April and May, caused some damage to buildings at places in the north of Italy. These shocks seem, accord- ing to M. Muthaon, to have taken the general direction N to S. or S. to N. in the district from Pignerol to La Perouse, or rather S.W. to N.E., parallel to the Alps. At Turin the shocks were much less frequent. Some were accompanied by noise, others not. The former seemed to shake the houses more violently than the latter, even when the ac- tual motion of the earth was slighter. The noise always immediately preceded the shock. The effects varied greatly between places at short distances from each other. In general the motion was felt more distinctly in houses built upon solid rock, but those standing on loose foundations suffered most actual injury. It was also remarked, that buildings, like bell- fries, which had small bases were generally but little injured. It was observed that a number of walnut-trees, torn up by the vio- lent gusts of wind, had their trunks all di- rected towards the north, though this pro- bably had no connexion with the earth- quake. Several luminous meteors were seen during the period of these shocks. The in- habitants of the valleys of the Clinone and Palice declared at the time that the	Vassali-Eandi's account of these shocks, addressed to the Imp- Acad. of Turin, 1808; Journ. des Mines, t. xxiii, p. 209; Journ. des Débats, 9, 11, 12, 14, 15, 19, 24, 25, 26 Avril, et 2, 6, 9 Mai; Moniteur, 9, 10, 11, 13, 14, 15, 16, 17, 19, 23, 25, 28, 29 Avril, et 3, 5, 7, 10, 18 Mai; Correspondance Vendouin; Studer's catalogue.	

third shock, which lasted 3 secs.), at Aix two shocks in 5 secs. At Abries 30 shocks were felt on this day.

of spring was ordinarily marked by slight shocks.

At the time of this first shock, at Chambéry the wind was cold and violent from the N.W. There had been a little snow at 4 and 5 P.M. The barometer at noon stood at 27 in. 1.2 line, and at 8 P.M. at 27 in. 2.2 lines. At the hospice on Mont Cenis several articles of furniture were displaced, and a noise like that of carriages was heard at the same time. At Geneva a bell was caused to sound. At Grenoble also a bell sounded twice, loudly and distinctly. At Mâcon and Montbrison the shock was slight. At Gap the great bell of the town sounded, and bells rang in many rooms. Several houses were injured at St. Jacques and in the hamlet of Sechier. At Corps and several other communes of the Upper Alps, the shock was preceded by a noise in the air like the collision of an innumerable number of stones. At Briançon 7 or 8 chimnies and some old walls were thrown down, and the large bell sounded thrice. At Abries a part of the belfry fell. At Marseilles the sky was clear, the thermometer stood at 4° below temperate, and the barometer, which had been at 28 inches, fell suddenly 2 lines, rising again during the following night to 28 in. 3 lines. The wind sensibly abated after the earthquake. The sky became clouded during the night, and some drops of rain fell in the afternoon of next day. At Toulon the machine for putting masts on board vessels (shears?) was raised more than an inch above its ordinary position by the shock. In Piedmont generally at the time of this first shock the weather was fine, settled, and dry: the nights were cold, and rain was much wished for, both for agricultural purposes and to supply the wells, which were for the most part dry.

	2.	3.	4.	5.	6.
April 2 5 th P.M. Mont. s at 9 ^h . rançon p 30 ^m . also at run.	The valleys of Piedmont above mentioned, the centre being, accord- ing to Vassal-Eandi, at Abrisca.	Less violent than the former shock.		Accompanied on Mont Cenis by the same noise as before.	Authorities quoted above (on the 2nd).
3	At La Tour	Moderate			Ditto.
9 th A.M.	Barga	Ditto			Ditto.
M.	Ditto	Severe. There were several other shocks during the day.		A dull tremulous noise was frequently heard during the day.	Ditto.
4	Ditto	Moderate.		Besides the shocks mentioned, slight tremulous motion was very frequent at this place, as well as the noise like a subterranean can- nonade, which recurred on the following days.	Ditto.
	Ditto	Ditto			Ditto.
M.	Ditto	Ditto			Ditto.
	Ditto	Ditto			Ditto.
	Ditto	Severe			Ditto.
	Ditto	Moderate. From the 2nd to the 4th there were seventy-five shocks felt at La Tour; they appear- ed to come from the east.			Ditto.
5	Ditto	Moderate			Ditto.
M.	Ditto	Ditto			Ditto.
M.	Ditto	Ditto			Ditto.

808. April 5. La Tour 3 P.M.	Slight. Other slight shocks had been felt during the night between the 4th and 5th.			Ditto.
— — — — — 6 P.M.	Severe	Barga		Ditto.
— — — — — 1 P.M.	Several slight shocks.	6. At Lisbon		Journ. des Débats, 28 Avril; Moniteur, 29 Avril.
— — — — —	Slight but very numerous shocks during the day.	Barga		Vassali-Bandi's Account, &c.
— — — — — 11 ^h 30 ^m P.M.	Ditto	7. Ditto		Ditto.
— — — — —	Moderate. Forty shocks had been counted since the 2nd.	8. Pignerol		Ditto.
— — — — — 6 A.M.	Moderate. Several other slighter shocks were observed.	9. Barga		Ditto.
— — — — — 9 P.M.	Ditto	Ditto		Ditto.
— — — — — 11 P.M.	Ditto	Pignerol		Ditto.
— — — — — 6 A.M.	Slight	10. Barga		Ditto.
— — — — — 10 ^h 38 ^m A.M.	Rather severe	La Tour		Ditto.
— — — — — 11 A.M.	Slight	Barga		Ditto.
— — — — — 3 P.M.	Ditto	Ditto		Ditto.
— — — — — 9 P.M.	Ditto	Ditto		Ditto.
— — — — — Also at 9 P.M.	Two rather severe shocks.	La Tour,		Ditto.

	2.	3.	4.	5.	6.
	La Tour	Violent			Vassali-Bandi's Account, &c.
apr. 11. 10 ^m minutes mid- of the					
— Briquerasque		A shock of greater severity than that of the 2nd.			Ditto.
— Ditto		Slighter than the last.		Slight noises were heard during the day	Ditto.
— Barga		Slight			Ditto.
— Ditto		Ditto			Ditto.
— 12. Ditto		Moderate		Several other feeble shocks during the day	Ditto.
— 1 st A.M.					Ditto.
— La Tour		Ditto. Similar shocks recurred during the day at intervals of about three hours.			
— Perouse		Rather violent.		There was a storm accompanied by thunder in Ditto. the evening, followed by snow.	Ditto.
— La Tour					Ditto.
— Ditto					Ditto.
— Ditto					Ditto.
— 13. Ditto		our moderate shocks			Ditto.
— morn.					
— Barga		A slight shock			Ditto
— La Tour, Villars, and Severe Bobbi.					Ditto.
— Ditto		Ditto			Ditto.
— 14. Briquerasque		Slight			Ditto,
—					

14. La Tour	Rather severe. There had been two feeble shocks during the morning, and twelve were reckoned in the course of this day and the following night.	.....	.....	Ditto.
— Briquerasque	A disastrous shock.	.....	.....	Ditto.
— M. La Tour	Severe	.....	.....	Ditto.
— Revel or Revello	A violent shock, lasting two seconds.	.....	.....	Ditto.
— M. Barga	Moderate.	.....	.....	Ditto.
— M. La Tour, and Lucerne	Very severe.	.....	.....	Ditto.
15. Revel, Pacsana, Barga, Cavour, and Lucerne. Also at La Tour, Turin, Saluces, &c.	Ditto	.....	.....	More damage was caused by this shock.
— Pignerol	Ditto. Followed by other shocks up to about 5 A.M.	.....	.....	At the first-named places some damage resulted, Ditto. at the last three however there was none.
— Gap and Briançon	Ditto.	.....	.....	Fresh damage done. The inhabitants quitted their houses.
— M. Briquerasque	A rather severe shock, preceded by some slight ones in the morning, and followed by some tremulous motion during the evening.	.....	.....	Ditto.
— M. Turin	Moderate.	.....	.....	Ditto.
— Barga, Nice, Revel, and in the valleys of Bronda, Writa, and Maira, and those of the Po.	Severe. Lasted three seconds at Barga, at which place a wall oscillated from W. to E. Several	.....	.....	The damage caused by the shock of the 2nd was renewed almost everywhere by this one.

2.	3.	4.	5.	6.
other shocks were felt there during the day. At Nice the shock was from N. to S., and lasted also three seconds. At Revel it lasted eight or nine secs. Severe.				
Still more severe				
Similar to the last				
Slight				
At St. Jean, very violent. At Nice and higher up the valley, also at Nice, Fenestrelle. Also felt at Geneva, Grenoble and Turin, and as far as Marsailles and Antibes				
At Fenestrelle, this shock was very severe, and seemed to last longer than that of the 2nd. At Turin the motion was undulatory, from S.W. to N.E. (or W. to E.), and lasted 8 seconds, during which time there were four distinct shocks.				
Very severe				
Severe, lasting more than eleven secs.				
A severe shock, lasting twenty seconds				

16. Briquerasque	Another severe shock. At Cavour there were two shocks between midnight and morning. Moderate.		Accompanied by dull noises which continued on the following days. The inhabitants quitted their houses.	Ditto.
17. Nice	Ditto. Direction at Embrun and Briançon = S.S.W. to N.N.E., lasting 12 secs. At Corps, fifteen oscillations were reckoned in 22 secs., the latter ones terminating by a kind of bound. Slight. Duration = 3 secs.		It was remarked that the shocks were felt most violently in valleys among the mountains.	Ditto.
— Pissas, Embrun, Briançon, Gap, and Corps (Isère).				Ditto.
— Ivree	Slight. Duration = 3 secs.			Ditto.
— Cinsolo, and near the Pic de Viso.	Two or three little shocks. At Barga several oscillations and more tremulous motion during the day.			Ditto.
— Cavour	Two little shocks.			Ditto.
— Ditto	Another			Ditto.
18. Ditto	Moderate, from N. to S., lasting 3 secs. Violent. Some more slight motion was felt about noon.		At La Tour, at the same hour, two distinct detonations were heard, and a luminous meteor was observed.	Ditto.
— Nice	Three shocks		At Fenestrelle some arches were injured. At Pignerol the inhabitants encamped in tents.	Ditto.
— Cavour and Barga				Ditto.
— Fenestrelle. The first shock was felt also at Pignerol.				Ditto.
— Barga	Moderate.			Ditto.
— M.				

1.	2.	3.	4.	5.	6.
Apr. 18. <i>La Tour</i>	Slight. Followed by another shock a little after, and by three more slight ones during the night.				Vesali-Bardi's Account, &c.
19. <i>Barga</i>	Moderate.				Ditto.
1 st A.M.	Ditto				Ditto.
M.	Ditto				Ditto.
M.	<i>La Tour</i>	Four slight shocks. Several others during the day.			Ditto.
it noon.		Slight			Ditto.
20. <i>Barga</i>		Ditto			Ditto.
M.	Ditto	Ditto			Ditto.
M.	Ditto	Ditto			Ditto.
M.	<i>Pignarol</i>				Ditto.
1 st A.M.	Ditto, and at <i>Barga</i>	Severe			Ditto.
M.	<i>Briquerasque</i>	Ditto. Followed by several lighter shocks during the day and night.			Ditto.
5 th A.M.		Very severe. Direction at Lucerne N.E. to S.W. Several slight movements there during the following night.			Ditto.
7 th A.M.	Lucerne and Saluces. Also felt at <i>Pacalieri</i> and <i>La Tour</i> .	At Saluces the shock lasted 5 or 6 seconds. At <i>Pacalieri</i> and <i>La Tour</i> several others			Ditto.
					Accompanied at Saluces by a dull noise. At Lucerne fresh ruins were produced.
					The buildings suffered fresh injuries.

1808, Apr. 20, Nice	had been felt during the preceding night.			Ditto.
10 P.M.	Slight			Ditto.
21. Pignorol				
2 ^d 30 ^m A.M.				
5 A.M.	Barga and Briquerasque. Rather severe		Two detonations heard during the following night.	Ditto.
6 ^h 15 ^m A.M.	Saluces			Ditto.
5 ^h 20 ^m A.M.	Pignorol			Ditto.
22. La Tour	Moderate			
7 ^h 15 ^m A.M.	Ditto		Small rumblings were observed three or four times during the preceding night.	Ditto.
9 ^h 45 ^m A.M.	Barga		About 3 P.M. a waterspout passed over the territory of Marennas.	Ditto.
During the morning.	Ditto		A storm of thunder and hail during the day	Ditto.
Midnight.				Ditto.
23. Briquerasque and Pignorol, and at Revello.	Ditto. Most perceptible at Revello, where the earth trembled many other times during the day.			
9 P.M.	Severe; followed by two feeble shocks during the night.			Ditto.
9 ^h 15 ^m P.M.	Barga			Ditto.
25. Ditto	Slighter shocks during the day.			Ditto.
At night.				Ditto.
26. Ditto	Ditto. Similar ones felt at Pignorol during the day.			Ditto.
7 ^h 45 ^m P.M.				Ditto.
27. Saluces	Slight			Ditto.
11 ^h 30 ^m A.M.				

1.	2.	3.	4.	5.	6.
Apr. 27. Barga	Slight				Vasali-Eandi's Account, &c.
10 th P.M.					
28. Pignerol	Rather severe				Ditto.
M.					
Briquerasque	Slight			Accompanied by rumbling noise	Ditto.
M.					
Barga	Moderate			Attended with subterranean noise lasting 30 seconds.	Ditto.
10 th A.M.					
29. Ditto, and at Briquerasque.	Slight at Barga, and still more so at Briquerasque.				Ditto.
M.					
Pignerol	Two shocks of considerable severity.				Ditto.
2 nd A.M.					
30. Briquerasque	Slight shocks, recurring at 4 A.M.				Ditto.
M.					
La Tour	Two rather severe shocks.				Ditto.
noon 2 nd S.A.M.					
Barga	Moderate			Accompanied by noise like that of a cannonade, ending with two explosions.	Ditto.
M.					
Pignerol	Very severe				Ditto.
15 th A.M.					
1 st P.M.	Slight			Noises had been constantly heard at this place since the 24th, but no shocks, except the two on the morning of this day	Ditto.
May 1. Pignerol	Very severe				Ditto.
3 rd A.M.					
Saluces. More perceptible in the valley of the Po.	Slight, in the direction W. to E.				Ditto.
1 st A.M.					
Barga	Moderate.				Ditto.
M.					
Ditto	Ditto				Ditto.
M.					
Pignerol	A shock of greater intensity than that of 15 mins. past midnight. Some feebleness during the day.			Accompanied by noise	Ditto.
3 rd A.M.					

— Barga	Slighter than that of 1 A.M.	On this day the fault were more violently shaken and suffered more damage than others lower down towards the plain. On this day a volcano opened in the island of Ditto. St. George, Azores. The eruption was of great violence, and did not cease before the 5th of June. Philosophical Transactions of New York, 1815, p. 315.	Ditto.
— 2 Ditto	Slight shocks		Ditto.
— Ditto			Ditto.
— Ditto	This shock and the last were not equal in intensity to one- seventh of that at 2 A.M.		Ditto.
— Pignerol	Slight		Ditto.
— Briquerasque	Ditto. Several very slight shocks be- tween midnight and morning.		Ditto.
— 3 Salces. Also felt at Pagao.	Undulatory, from W. to E.		Ditto.
— Coni	Violent		Ditto.
— Barga	Slight shocks; several were felt between 4 and 5 A.M.		Ditto.
— Briquerasque	Slight shocks		Ditto.
— 4 Barga	Very slight		Ditto.
— A.M. ?)			Ditto.
— Ditto	Ditto		Ditto.
— or			

1.	2.	3.	4.	5.	6.
Apr. 27. 0 ^m P.M.	Barga	Slight .....	.....	.....	Vassali-Bandi's Account, &c.
— 28. M.	Pignerol	Rather severe .....	.....	.....	Ditto.
— M.	Briquerasque	Slight .....	.....	Accompanied by rumbling noise	Ditto.
0 ^m A.M.	Barga	Moderate .....	.....	.....	Ditto.
— 29. M.	Ditto, and at Briquerasque.	Slight at Barga, and still more so at Briquerasque.	.....	.....	Ditto.
— M.	Pignerol	Two shocks of considerable severity.	.....	.....	Ditto.
— 30. M.	Briquerasque	Slight shocks, recurring at 4 A.M.	.....	.....	Ditto.
— M.	La Tour	Two rather severe shocks.	.....	.....	Ditto.
seen 2 3 A.M.	Barga	Moderate .....	.....	Accompanied by noise like that of a cannonade, ending with two explosions.	Ditto.
— M.	Pignerol	Very severe .....	.....	.....	Ditto.
15 ^m A.M.	La Tour	Slight .....	.....	Noises had been constantly heard at this place since the 24th, but no shocks, except the two on the morning of this day	Ditto.
0 ^m P.M.	La Tour	Very severe .....	.....	.....	Ditto.
May 1. 5 ^m A.M.	Pignerol	Slight, in the direction W. to E.	.....	.....	Ditto.
— 0 ^m A.M.	Saluces. More perceptible in the valley of the Po.	Moderate .....	.....	.....	Ditto.
— M.	Barga	Ditto .....	.....	.....	Ditto.
— M.	Ditto	Ditto .....	.....	.....	Ditto.
— 3 ^m A.M.	Pignerol	A shock of greater intensity than that of 15 min. past midnight. Some feel- ings during the day.	.....	Accompanied by noise	Ditto.

— P.M. —	Barga	Slighter than that of 1 A.M.	shaken and suffered more damage than others lower down towards the plain.	Ditto.
— 2 —	Ditto	Slight shocks	On this day a volcano opened in the island of St. George, Azores. The eruption was of great violence, and did not cease before the 5th of June. Philosophical Transactions of New York, 1815, p. 315.	Ditto.
— — —	Ditto .....	.....	.....	Ditto.
— — —	Ditto	This shock and the last were not equal in intensity to one-seventh of that at 2 A.M.	.....	Ditto.
— P.M. —	Piguerol	Slight .....	.....	Ditto.
— — —	Briquerasque	Ditto. Several very slight shocks between midnight and morning.	.....	Ditto.
— 3 —	Saluces. Also felt at Piasco.	Undulatory, from W. to E.	.....	Ditto.
— 5 ^h —	Coni	Violent .....	.....	Ditto.
— A.M. —	Barga	Slight shocks; several were felt between 4 and 5 A.M.	.....	Ditto.
— — —	Briquerasque	Slight shocks .....	.....	Ditto.
— 4 —	Barga	Very slight .....	.....	Ditto.
— (A.M. ?) —	Ditto	Ditto .....	.....	Ditto.
— L. or —	Ditto	Ditto .....	.....	Ditto.

1.	2.	3.	4.	5.	6
May 5. M.	Barga, and at Briquerasque.	At Barga a single shock; at Briquerasque several very slight ones.			Vassal-Randi's Account, &c.
— M.	Barga ..	Another slight shock.			Dit
— 30 th to M.	La Tour ..	Three slight shocks in the time mentioned. Nothing had been felt at this place for 48 hours before.		One of these shocks was accompanied by an explosion like the report of a cannon.	Ditto.
— M.	Briquerasque ..	Slight ..			Ditto.
— L.M.	Pignerol, Barga, Cavour, and La Tour.	Very severe at Pignerol, and rather so at the three other places.		Preceded, at Pignerol, by three explosions apparently coming from Lucerne.	Ditto.
— 30 th P.M.	Pignerol ..	Very severe.			Ditto.
— 6.	Ivrée ..	Rather severe. Lasted 10 or 12 seconds.			Ditto.
— 10 th A.M.	Briquerasque ..	Slight ..			Ditto.
— M.	Barga ..	Ditto ..			Ditto.
— ween 2 3 A.M.	Briquerasque and Pignerol.	Severe at Briquerasque; more so at Pignerol than the shock of the night before.		At La Tour dull rumbling noises were heard towards the evening, which continued the whole night and following day.	Ditto.
— M.	La Tour ..	Moderate ..		Preceded by a kind of hissing sound, and followed by a rumbling noise about half an hour after.	Ditto.
— 20 th A.M.	Barga and Briquerasque.	Slight shocks at Barga; at Briquerasque but one was felt.			Ditto.
— 30 th A.M.	Briquerasque ..	Another slight shock.			Ditto.

awn.	Ditto	Some slight tremblings.	Ditto.
3 and 4	Ditto	Slight undulations	Accompanied by a rumbling noise, and explosions as of cannon underground.
evening.	Barga	Slight shocks	Ditto.
1.	Ditto, and at Figneral and Briquerasque.	At Briquerasque the motion was scarcely sensible, but at Figneral it was very severe. There had been slight shocks at the latter place for some days before.	Ditto.
2 A.M.	Briquerasque and La Tour.	Motion scarcely perceptible at Briquerasque. At La Tour the shock was slight and lasted 4 or 5 seconds.	Three loud explosions were heard at La Tour between 1 ^h 30 ^m and 3 ^h 30 ^m A.M.
10. Midnight	Briquerasque	Some slight shocks.	Ditto.
5 9th.	La Tour	Two more slight shocks.	Ditto.
seen 1	Ditto	Slight movements five times within an hour.	At Barga some slight rumbling noise was felt on this day, but no shock.
2 A.M.	Figneral	Slight. Similar shocks on the preceding days.	Ditto.
3 A.M.	La Tour. Also at Briquerasque.	Moderate at La Tour. At Briquerasque slight shocks had been frequently felt	Rumbling noises had commenced at La Tour between 3 and 4 A.M., and recurred frequently during the day. Two, very loud, were heard at 3 ^h 30 ^m and 10 ^h 30 ^m P.M. The noises re-

1.	2.	3.	4.	5.	6.
		from midnight until the morning of this day, especially towards the mountains. They occurred at the hour hereafter mentioned, and were frequently at 9 P.M.		current like explosions the next morning at 6 A.M., and were frequently heard during the day.	
May 13 5 th A.M.	Pigneroi	Very severe. Several shocks, continuing the day.			Vassall-Randi's Account, &c.
— between 2 nd and 3 rd A.M.	La Tour	Two very perceptible shocks.		All was quiet at this place during the remainder of the day, until 10 P.M., when an explosion was heard.	Ditto.
— A.M.	Pigneroi	Another shock, similar to that of 2 nd 45 ^m .			Ditto.
— 5 th A.M.	Ditto	Very perceptible			Ditto.
— 5 th A.M.	Ditto	Both this and the last shock lasted rather a long time.		Accompanied, as was the last shock, by a prolonged noise.	Ditto.
— 9 th A.M.	La Tour	Slight		Accompanied by rather a loud noise. At 2 A.M. a subterranean explosion.	Ditto.
— 9 th P.M.	Ditto	Slighter than the last.			Ditto.
— 13 th A.M.	Briquerasque	Undulatory motion lasting several hours.		At La Tour a single explosion was heard during the night.	Ditto.
— 16 th A.M.	The country lying along the river Pélise.			A red cloud hung over the river and the surrounding district; at the moment of the shock there was an odour of sulphur, and altogether became imperceptible four minutes afterwards.	Ditto.
— M.	Briquerasque	Very slight. Undulatory movements were also felt.		Buildings continued to suffer damage. Those which had been already propped up, had now to be still more strongly supported, in order to prevent their destruction. The catalogue of these shocks by M. Vassall-Randi, from which	Ditto.

12. Barga	A violent shock			Preceded by a noise like that of a rapidly driven carriage.	Journ. des Débats, 10 Juillet.
23. Montalto-di-Chieri, A.M. Stura, Italy.	La Shocks			During a dreadful tempest	Ditto, 15 Juillet.
24. In Iceland	A severe earthquake			A new hot spring made its appearance, and others ceased to flow for fifteen days.	Eyrið, Abtregé des Voyages modernes, t. vii. pp. 51 et 273.
25. L. Turin	Two slight shocks			Accompanied by explosions	Journ. des Débats et Moniteur, 18 Juillet.
26. At Mount Etna	Several shocks				Ann. de Chim. et de Phys. sec. cit.
27. Pignarol	Another slight shock, which seemed to come from the S.E.				Journ. des Débats et Moniteur, 14 Octobre.
28. Mount Etna	Several shocks during the month.			Ditto	Ann. de Chim. et de Phys. sec. cit.
29. t. 22. Fignarol	Three more shocks.			Some chimaises were thrown down by one of the shocks.	Journ. des Débats, 5 Nov.
30. 26. Leghorn	Several shocks				Journ. des Débats et Moniteur, 13 Nov.
31. r. 22. Pignarol	A rather severe shock.			M. Perrey seems to think that the shocks at this place in September, October and November, present some indication of periodicity.	Journ. des Débats, 3 Déc.
32. Marche in the department of Sambre-et-Meuse.	A shock of 2 or 3 seconds duration.			During the night of the 12th of this month a number of avalanches in Switzerland—an earthquake suspected. (Journ. des Débats, 9, et Moniteur, 10 Janv. 1809.)	Ditto, 4 Janv. 1809.
33. Janina in Epirus	Shocks on one day during the month.				M. Pouqueville, sec. cit.
34. Mount Etna	Several shocks during the month.			Accompanied by explosive noises	Ann. de Chim. et de Phys. sec. cit.
35. Kionkable in West Gothland, Sweden.	One shock			No damage done. Keilhan, quoting Kefertuin, gives the date Jan. 19.	Moniteur, 1 Avril, 1809.
36. Dunning in Perthshire	Direction = N.W. to S.E.			Preceded and succeeded by a loud subterranean noise like thunder, lasting altogether about a minute. The atmosphere was calm, dense, and cloudy. The thermometer at 17° Fahr.	Tilloch's Magazine, vol. xxxiii. p. 91.
37. Courtraï	A slight shock.			During a terrible tempest	Moniteur, 5 Févr.
38. Janina in Epirus	Shocks felt on one day during this month.				Pouqueville, sec. cit.

1.	2.	3.	4.	5.	6.
Jan. ...	Mount Etna	Shocks during the month.			Ann. de Chim. et de Phys. <i>loc. cit.</i>
Feb. 15.	Grenoble	One shock			Journ. des Débats, 20 Fév.
—	San Germano (where ...)	A shock of sufficient violence to make the inhabitants quit the town.			Ditto, 11 Mars; Moniteur, 12 Mars.
—	and 17.				
—	Mount Etna.....	Earthquake again during this month.			Ann. de Chim. et de Phys. <i>loc. cit.</i>
Mar. 13.	Pignerol and its neighbourhood.	Another shock		Preceded by a loud explosion	Journ. des Débats, 25 Mars.
—	10 th A.M.				Ditto, 31 Mars.
—	20.	Ditto		Accompanied by eruption of the volcano	Ann. de Chim. et de Phys. <i>loc. cit.</i>
—	27.	Mount Etna			Catalogue of M. Studer.
April 26.	Berne	A feeble vibration			Moniteur, 13 Mai.
—	30.	Cavour, in the arrond. Pignerol.			Ann. de Chim. et de Phys. <i>loc. cit.</i>
—	Etna			Houses were injured	Moniteur, 25 Mai et 19 Juin; Journ. des Débats, 18 Juin.
May 3.	Island of Corfu	Many shocks		During a violent storm. Vessels were in eruption. Perhaps the days on which the shocks were felt in Corfu.	Moniteur, 25 Mai et 19 Juin.
—	5.				
—	S. At Naples	A shock			Ann. de Chim. et de Phys. <i>loc. cit.</i>
—	Jaaina in Epirus	Three days during the month marked by shocks.			Journ. des Débats, 11 Juillet.
—	Etna	Another shock			M. Studer's Catalogue.
June 26.	Pignerol	Vibratory			
—	29.	Tbun, and in the Sim. neutral, Switzerland.		Accompanied by a noise like that of carriages. Cattle bellowed in their stalls.	Journ. des Débats, 9 et 11 Juillet.
July 2.	Dusseldorf and the neighbourhood.	Two shocks			Ditto.
—	10 th A.M.		On the 4th an extraordinary flux and reflux of the sea.		Ditto, 11, 17 Juillet et 4, 10 Août; Moniteur, 19 Juillet et 11 Août.
—	3.	Pignerol			

1809. Aug. 1.	In the Abruzzi Ulteriora, at Aquila.	A severe shock, followed by twenty others before the following day. Undulatory motion continued at least up to the 5th.	noese territory, occurring at intervals of $\frac{1}{4}$, $\frac{1}{2}$, or 1 hour. A similar phenomenon near Lisbon on the same day, and at Naples on the 27th of the month (<i>terremoto di mare</i>).	Some springs appeared to boil up	Journ. des Débats, 21 Août et 2 Sept.; Moniteur, 24 Août et 3 Sept.
— 24. — 1 P.M.	Teramo in the same district.	One shock			
— 25. — Some min. after 1 P.M.	Macerata in the same region.	A violent shock of 8 or 10 secs. duration.		Houses were injured	Journ. des Débats, 8 et 10 Sept.; Moniteur, 9, 12 et 19 Sept. Ditto.
— — —	Janina in Epirus	Earthquake on one day of the month.			Pouqueville, <i>loc. cit.</i>
— Sept. — Oct. 26. 9 ^h 50 ^m P.M.	Etna				Ann. de Chim. et de Phys. <i>loc. cit.</i>
— Nov. 23. Between 2 and 3 A.M.	Lisbon	A rather violent shock.			Moniteur, 2 Déc.
— Dec. 4. 10 P.M.	Copenhagen	A slight shock.			Ditto, 11 Déc.
— — —	Cape Town, Cape of Good Hope.	Three shocks from N. to S.; followed, after an interval of ten minutes, by one more. The second shock was by far the most violent.	A heavy swell came into Table Bay after the shocks.	Accompanied by noises like the firing of several pieces of heavy artillery in quick succession, followed by a low rumbling. Immediately after the shock the wind changed from S.S.E. to N.N.W., and then ceased altogether. The sky became clear, and numerous meteors were observed.	Philosophical Magazine (continuation of Tilloch's Magazine), vol. ix. p. 72.
— 5. — 7 A.M.	Ditto	Another shock		Accompanied, as before, by a noise like thunder.	Ditto.
— — — 12 ^h 30 ^m noon.	Ditto	Ditto		Ditto	Ditto.

1.	2.	3.	4.	5.	6.
Dec. 5. Cape Town, Cape of Good Hope.		Slight oscillation		Accompanied by a low rumbling noise. Very many people asserted that they felt the shocks on the bursting of the nucleus, which were very brilliant, and seen by all. On the morning of the 5th, in Blauweberg's valley, several fissures opened in the earth, <i>some of them nearly a mile in length</i> , and varying in depth from 3 to 10 feet, and in breadth from 1 to 5 inches. Muddy water was thrown up to the height of 6 feet from some small holes which opened in the sandy soil of this place.	Philosophical Magazine (continuation of Tilloch's Magazine), vol. ix. p. 72.
Jan. 14. 3 rd P.M.	Elma..... Vienna.....	Two shocks, separated by an interval of some seconds.		Accompanied by a cracking noise. The ice of the Danube was broken. An astronomical clock was stopped, the pendulum of which did not move in the direction N.E. to S.W. Others, oscillating in this direction, were not affected. At Mount Czoka subterranean bellowings had been heard for eight days. Many buildings were thrown down, and several springs of mineral water made their appearance.	Ann. de Chim. et de Phys. <i>loc. cit.</i> Journ. des Débats, 30 et 31 Janv., 13 Fév.; Monteur, 29 Janv., 1 et 15 Fév.
15 th and 16 th P.M.	In Hungary; the centre of disturbance was apparently the mountain Czoka.	The earth trembled violently. At Czakenberg the shocks were very intense; 177 were felt up to the 19th.			Uttro.
— 21.	Komarom (Komorn?) in Hungary.	Another earthquake			Péronac, Bull. des Sciences Nat. t. xviii. p. 195.
— 22. P.M.	Pignerol, La Tour, and Lucerne.	Another shock		Accompanied by an explosion. M. Perrey remarks that this is another instance of the periodical recurrence of the shocks of the district of Pignerol on the 22nd of the month.	Journ. des Débats, 4 Fév.
Feb. 3. P.M.	Czakwar in the territory of Stuhlweissenburg, Hungary.	Some shocks as violent as those of the 14th Jan.		Houses situated on a mountain were observed to be lighted up after the shocks; it was supposed by the redexion of subterranean fire from some opening in the earth caused by the earthquake (!) (?)	Ditto, 13 Mars.
— 16. 5 th P.M.	Trieste.....	A rather violent shock.			Ann. de Chim. et de Phys. <i>loc. cit.</i> ; Journ. des Débats, 28 Fév., 5 et 14 Mars; Monteur, 2 Mars.
—	Naxos and Oenoto	At Naxos a shock		Various were trembled	

1810. Feb. 16. At night (probably about same time as at Naples).	Malta	minute. At Otranto its violence was terrible; the inhabitants spent the night out of doors. The most violent shock felt up to that time in Malta. Lasted two minutes.	.....	.....	of which one was felt in Malta, in Africa (that here recorded), and even in the island of Cyprus.	Moniteur, 2 Mai; Gentleman's Magazine, vol. lxxx. p. 371.
— Nearly at same time as with last event.	The town of Candia, in the island of same name.	A violent earthquake.	.....	.....	The city was ruined, and 2000 persons perished.	Huot, Géologie; Journ. des Débats, 19 Mai ("sous la rubrique de Candie, 26 Mars").
— 17. 2 ^h 15 ^m A.M.	Naples	Another shock. Direction E. to W.	.....	.....	.....	Journ. des Débats et Moniteur, <i>loc. cit.</i>
—	Malta	Two more shocks, less violent than the former one.	.....	.....	.....	Moniteur, 2 Mai.
— Mar. 16.	Langres in the departm. of Haute-Marne, and Is-sur-Tille in the Côte-d'Or.	A shock from N. to S.	.....	.....	.....	Journ. des Débats, 23 Mars et 17 Avril; Huot.
— 25.	Island of Teneriffe	A very violent earthquake.	.....	.....	Many people perished beneath the ruins of the houses.	Journ. des Débats, 4 Juin, 1810; Huot, Géologie, t. i. p. 114.
— and even in April	In Hungary	Some slight shocks still felt, but less frequently than before.	.....	.....	.....	Moniteur, 9 Mai (sous la rubrique de Vienne, 24 Avril).
— April 8. 7 ^h 25 ^m P.M.	Calcutta and other places in Bengal.	Two shocks from N.E. to S.W., the first lasting 6, and the second 30 secs.	.....	.....	.....	Gentleman's Magazine, vol. lxxx. pt. 2. p. 378.
— 14.	Moor in Hungary	A very severe shock	.....	.....	.....	Journ. des Débats, 22 Mai; Moniteur, 23 Mai.
—	Janina in Epirus	.....	.....	.....	.....	Pouqueville, <i>loc. cit.</i>
— May 15.	Moor in Hungary	Two more shocks of great severity.	.....	.....	.....	Journ. des Débats et Moniteur, 5 et 6 Juin.
— June. ... Beginning of the month.	Ditto	Another shock	.....	.....	.....	Moniteur, 7 Juillet.

	2.	3	4.	5.	6.
une 25. In East Gothland, Sweden.	A vibration lasting one second.				Moniteur, 31 Juillet; Journ. de l'Empire, 30 Juillet et 14 Août.
July 1. In the neighbourhood of Niachneksamtschatsk.	Several shocks ..				Moniteur, 23 Juillet, 1811.
— 4. Moor in Hungary ..	Another shock ..				
— between Sienna and Arezzo ..	Two shocks, of sufficient severity to throw down articles of furniture.			Houses were thrown down ..	Journ. de l'Empire, 10 Août.
17.				A terrible storm at Leghorn on the 7th ..	Moniteur, 26 Juillet
— 13. Moor in Hungary ..	Another shock ..				
— between Lubring in Croatia ..	A severe shock ..			Accompanied by subterranean noise like a clap of thunder.	Journ. de l'Empire, 10 Août.
nd 23.					
t mid.					
— 23. Ditto ..	Another shock, less violent.				Ditto.
xon. 27. Hermanstadt in Transylvania.	A very severe shock ..			Accompanied by subterranean noise ..	Journ. de l'Empire, 5 Sept.; Moniteur, 6 Sept.
— 28. Ditto ..	Ditto ..			Ditto ..	Ditto.
m.?)					
— 29. Ditto ..	Ditto ..			Ditto ..	Ditto.
— 30. Ditto ..	Ditto ..			Ditto ..	Ditto.
l.					
— and San Miguel in St. Michael's, Azores.	Severe shocks ..			The commencement of the violent disturbances which this island experienced in 1810-11. The authorities here given apply to both years.	Journ. de l'Empire, 11 Oct. 1810, et 27 Sept. 1811; Webster in <i>Eyries</i> , <i>Nouv. Ann. des Voy.</i> t. xvii. Jann. 1823, p. 48; v. Humboldt, <i>Voy. aux rég. équinox.</i> t. i. pp. 187, 377 et 391. t. v. p. 7; v. Buch.
Aug. 11. Ditto ..	Ditto. The shocks continued, though but slightly, up to January 1811.			The village of Las Casas, consisting of 22 houses, disappeared, and a lake of boiling sulphurous water appeared in its place. There had been a slight eruption of the <i>Pe de la Cruz</i> in January 1811.	Ditto; Annual Register, vol. llii. p. 89.

1810. Aug. 31. Saumur in France. Also 7 ^h 58 ^m A.M. felt in Vendée.	Also A severe shock. In Vendée it lasted 3 or 4 seconds.	.....	Accompanied by subterranean noise like that of Journ. de l'Empire, 8, 14 et 15 a heavy-laden carriage in rapid motion. On the same day remarkable meteors were ob- served.
— Sept. 1. Inspruck 8 ^h 15 ^m A.M.	A shock, without any oscillation.	.....	Followed soon after by a very loud subterranean noise. It seems however doubtful whether this shock was not the effect of an explosion of gunpowder which took place at Eisenach (at 8 ^h 45 ^m).
— 7. La Rochelle..... 7 ^h 45 ^m A.M.	A shock from S. to N.	.....	Journ. de l'Empire, 16 Sept.
— 10. Brest 7 A.M.	A severe shock, fol- lowed by another during the night. Rather violent shock, from N.E. to S.E. (?) Second and last earth- quake during the year.	.....	Accompanied by a noise like that of a large vehicle. Ditto, 18 Sept.
— 13. Gross-Kanisch in Hun- gary. 10 ^h 5 ^m P.M.	Second and last earth- quake during the year.	.....	Ditto, 11 Oct.
— Oct. Be- ginning of the month.	Twenty-six shocks, of which five were very disastrous.	.....	Pouqueville, <i>loc. cit.</i>
— 24. Reykiavik and around Mount Hecla, Ice- land.	An earthquake	.....	Journ. de l'Empire, 20 Oct.
— ... In Norway and in Ger- many.	.....	.....	v. Hoff, Th. 2. S. 388.
— Nov. 2. Lisbon About 9 ^h 3 ^m P.M. (9 ^h 30 ^m at Portland probably an error.)	A slight shock..... At Portsmouth a vio- lent vibratory shock from N.W. to S.E., lasting one or two minutes. At Ken- nebunk there were several shocks du- ring about 20 secs. At Portland but a slight vibration.	.....	Ditto.
— 9. Portsmouth (N. Hamp- shire?) in the United States. Also felt at Kennebunk, Portland, Salem, Newburgh- Port, York, Exeter, Dover, Haverhill, and several other towns.	The shock was felt on board a vessel en- tering the harbour of Portsmouth; it was supposed that she had touched the bottom.	.....	Moniteur, 28 Nov. Ditto, 18 Janv. 1811.
— 29. At sea, to the south of Cape Matapan, Greece.	A violent shock, which lasted a minute and a half.	.....	Férussac, Bull. des Sc. Nat. t. viii. Sept. 1827, p. 51.

1.	2.	3.	4.	5.	6.
Dec. 23. M.	Turin and Parma. Also at Reggio, Verona, Venice, Florence, &c., but not everywhere at the same hour.	At Turin a rather severe shock; at Parma a violent one, followed immediately after by violent oscillations from E. to W., lasting nearly a minute. Some shocks supposed to have been felt.	.....	At Parma a sudden light was observed, followed by an explosion like a loud clap of thunder.	Journ. de l'Empire, 2 et 4 Janv.; Moniteur, 3, 8 et 9 Janv. 1811.
..... Int be- cu 26	Genoa .....	.....	.....	In the midst of a terrible storm	Ditto.
27. Jan 1. 0 ^m (A.M. &c.)	Tiflis in Georgia	Two consecutive shocks from S to N.	.....	.....	Journ. de l'Empire, 21 Avril.
28. and 31.	St. Michael's, Azores	The shocks, which had been but slight since August, were now very violent, especially on the 31st.	.....	On the 31st the town of Ponta Delgada was violently shaken by the earthquake. On the 1st of February a violent submarine eruption commenced at about two miles from the west coast; smoke, ashes, pieces of lava, and other ignited materials were thrown up in a column visible from the coast. The eruption lasted eight days, and produced a bank over which the sea broke. The phenomena recommenced in June following.	Webster and v. Humboldt, loc. cit.
Feb. 1. M.	St. Jean-de-Maurienne	Two slight shocks .....	.....	.....	Journ. de l'Empire, 18 Fév; Moniteur, 17 Fév.
18. March.	Rome, Frascati, Tivoli, &c. Etna. A shock on the 27th was felt throughout the whole island.	A violent shock .....	.....	.....	Journ. de l'Empire, 5 Mars; Moniteur, 4 Mars.
.....	Jacina in Epirus.	An earthquake .....	.....	.....	Ann. de Chim. et de Phys. loc. cit.
April 13. Pignoral	.....	One shock .....	.....	.....	Pauqueville, loc. cit.
14. Ditto	.....	Two other shocks, separated by an interval of 12 hours.	.....	.....	Moniteur, 30 Avril. Ditto.

1811. May. Island of St. Vincent in the West Indies. Beginning of the month; lasting until the 12th.	Many shocks. In the Antilles more than two hundred were reckoned from this time up to April 1812.			v. Humboldt, Personal Narrative, vol. iv. p. 36, and Voyages, t. v. pp. 5-14.
— 19. Constantinople	Some shocks from S. to N.		Attended with subterranean noise.....	Moniteur, 7 Juillet; Journ. de l'Empire, 8 Juillet.
— 21. Ditto	Ditto		Ditto	Ditto.
— 24. Ditto	Ditto		Ditto	Ditto.
— 29. Rome, Frascati, Tivoli, &c. 10 P.M.	A rather violent shock			Journ. de l'Empire, 13 Juin; Moniteur, 14 Juin.
— June 1. Plymouth..... 3 A.M.		At the hour mentioned, the sea suddenly retired, leaving the shipping dry, and in half an hour after, a wave of 10 or 11 feet in height came in with great violence. This recurred twice, though with diminished violence.	Accompanied by a tremendous noise and violent gusts of wind from the S.W. The mercury in the thermometer (barometer?) rose and fell tremulously during the rushing in of the wave.	Annual Register, 1811, p. 61.
— 13. St. Michael's, Azores ...	Severe and repeated shocks. During the eruption the ground on the island was in a continual state of vibration, varying in intensity with the eruption. The phænomena continued with great violence for four days, but had so much abated on the 4th of July that people were able to land on the volcanic island which had been formed.		The submarine eruption of February now recommenced at two miles and a half further from the coast than before. A mass of rock was detached, by the motion, from the coast of St. Michael's and fell into the sea. For an account of the details of the eruption, which was of great violence, and accompanied by a constant noise like a heavy and well-sustained fire of artillery and musketry, vide the authorities quoted above.	Webster and v. Humboldt, loc. cit.

1.	2.	3	4.	5.	6.
July 4. In Lapland	An earthquake			A volcanic eruption on this day from a mountain in the most northern part of Norway. (This is considered doubtful by Kellhan.)	Keferslein; Montieur, 9 et 21 Janv. 1812.
— 7. In Norway	Ditto				Kellhan, <i>loc. cit.</i>
— 15. Genoa	A shock of short duration, but rather violent.			The heat for three days before had been suffocating.	Journ. de l'Empire, 27 et 29 Juillet; Montieur, 28 Juillet.
— 16. Leghorn	A severe shock				Ditto
— 29. Verona	A slight shock, lasting three seconds. This was the second felt during the preceding month.				Montieur, 21 Août.
Aug. 1. Reggio in the Duchy of Modena.	A rather violent shock. A slight one had been felt nearly a month before.				Ditto, 5 Sept.
— 5. In Lapland	Another earthquake..				
— Janina in Epirus	One earthquake during the month.			Another eruption on this day in the north of Norway, doubted as before by Kellhan.	Keferslein; Montieur, 9 et 21 Janv. 1812. Pouqueville, <i>loc. cit.</i>
Sept. 10. In Lapland	Another earthquake..				Keferslein; Montieur, 9 et 31 Janv. 1812.
— Janina in Epirus	One earthquake during the month.				Pouqueville, <i>loc. cit.</i>
Oct. 4. Vienna. Also felt in Upper Styria and Carinthia.	At Vienna a slight shock of three seconds' duration. In Styria and Carinthia two very violent shocks, from S.E. to N.W.			The clocks of the Observatory at Vienna were not stopped. At Krieglach some chimnies were thrown to the S.E.	Journ. de l'Empire, 18 et 19 Oct.; Montieur, 17, 20 et 21 Oct.
— Messina	Several shocks during the month. The most violent was on the 27th.			Etna was in eruption	Journ. de l'Empire, 28 Nov. et 28 Déc.; Montieur, 27 Déc.
Nov. 17. Muzzanbach in Styria.	Several shocks, each lasting half a se-			The weather was heavy. No noise was observed.	Montieur, 7 Déc.

	cond, but less violent than those of the 4th of October. Apparent direction W. to E.				
v. 25. In the Grisons, Switzerland. 10. 31. Portsmouth, Gosport, &c.	Many shocks during this period. Lasted nearly a minute.				
A.M. 12. Marienberg, Annaberg, Elbogen, Saatz, Kadén, &c., on the N.W. frontier of Bohemia.	At Marienberg and in the mountains of Saxony two violent shocks. At Hanenstein the direction of motion was S. to N. At Annaberg it was S.E. to N.W. At Kadén, Elbogen, and Saatz the shock lasted a minute.				

1.	2.	3.	4.	5.	6.
<p>actionati- 0th A.M., than half now after; 10th, and even 10 A.M. At n(Ohio), even 2 3 A.M. Zainen- , Spring- , and the gbbour- (Ohio), t 3 A.M., 10th, 10th and 25th noon.</p>	<p>long-continued shocks were for the most part very slight.</p>	<p>first was the most violent, and lasted a minute. At St. Louis there were shocks lasting 1½ 2, 1, ½ min., and 50 secs. At Vincennes there were three shocks, followed by a fourth at sunrise, and several others during the day. At Cincinnati the mo- tion seemed to com- mence on the 13th about 11 P.M. The most violent shock, at 2nd 20th A.M. on the 16th, lasted five minutes, according to some, and but two, according to others. The others felt here were of shorter duration, and feebler. At Dal- ton the motion was almost continuous for two days. At Zanesville, Spring- field, &c., where the direction N.E. to S.W., there were several shocks next day.</p>		<p>ped at these places. The air was quite calm, and no noise was heard. During these shocks great clefts opened in the ground, from which quantities of water, sand, and pieces of coal were thrown out. Large lakes were formed in many places. The level of the ground was permanently raised and depressed in various localities, and a bar thrown up across the Mississippi. Trees were seen to bend before the shocks, and were often locked together so that their branches were torn and broken. For further details see the authorities quoted.</p>	

Dec. 18, Verous..... A shock of 3 seconds' duration. The shock
A slight fog prevailed at the time, but soon after, on the 19th, a heavy fog set in, and continued until the 21st, when it cleared away.

<p>n. 6. In the valley of the Mississippi, especially at New Madrid. It extended 200 miles from this place (in every direction?).</p>	<p>us were until the terrible earthquake of March 26 following.</p>	<p>.....</p>	<p>p. 5.</p>	<p>The town of New Madrid was greatly injured... Silliman's Journal, vol. iii. p. 20; Iluot, Géologie, t. i. p. 114.</p>
<p>- 17. In the province of Södermanland, Sweden.</p>	<p>Two shocks. The first was rather feeble, and was followed, after an interval of a minute, by the second, of greater violence and lasting 15 seconds. (Five or six undulations were counted per second.)</p>	<p>.....</p>	<p>.....</p>	<p>The weather was calm, and the sky cloudless, but the earth was enveloped in a thick mist. The barometer varied frequently during the phenomenon. Moniteur, 15 et 23 Fév.; Journ. de l'Empire, 16 Fév.</p>
<p>- 18. In Oxfordshire</p>	<p>Trembling lasting ten minutes.</p>	<p>.....</p>	<p>.....</p>	<p>Attended by a heavy rumbling noise Gentleman's Magazine, vol. lxxviii. pt. 1. p. 80.</p>
<p>- 23. New Orleans, and still more at Pensacola.</p>	<p>A slight vibration which lasted but a few seconds.</p>	<p>.....</p>	<p>.....</p>	<p>The weather was fine, and the air calm, or at most there was a very gentle breeze. Moniteur.</p>
<p>- 26. Genoa</p>	<p>A shock of 2 or 3 seconds' duration.</p>	<p>.....</p>	<p>.....</p>	<p>Journ. de l'Empire, 11 Fév.</p>
<p>- 27. Ditto</p>	<p>A second shock, of greater violence but shorter duration.</p>	<p>.....</p>	<p>.....</p>	<p>Ditto.</p>
<p>- ... Janina in Epirus</p>	<p>One earthquake during the month.</p>	<p>.....</p>	<p>.....</p>	<p>Pouquerelle, loc. cit.</p>
<p>p. 1. At the salt-works of Ischi, in the neighbourhood of Lintz.</p>	<p>A rather severe shock.</p>	<p>.....</p>	<p>.....</p>	<p>A building was cracked by the shock Moniteur, 9 Mars.</p>

1.	2.	3.	4.	5.	6.
Feb. 3. Macerata in the States A shock in the direction of the N.W. from S.E. with a perceptible oscillation for 3 or 4 seconds.					Moniteur, 29 Fév.; Journ. de l'Empire, 1 Mars.
4. Ditto	Perceptible shocks				Ditto.
7. New Orleans, and still A slight oscillatory motion like that of a ship when getting under weigh. It occurred twice or three in two minutes. During this day and the following there was continual oscillation in the basin of the Mississippi				The year before these repeated shocks on the Mississippi, it had been remarked that Louisiana was almost quite exempt from storms.	Moniteur, 29 Fév.; Humboldt, <i>loc. cit.</i> ; Moniteur.
9. East Haddam, Connec. Two of the slight ramblings so often felt or heard here.				The weather was clear	Silliman's Journal, vol. xxix. p. 339.
Macerata in the States Two shocks, more severe at San-Severino than at Mucera.					Moniteur, 29 Fév.; Journ. de l'Empire, 1 Mars.
Mirabel in the departm.					Journ. de l'Empire, 25 Mars.
15. Ditto	Another shock				Ditto.
16. Ditto	Another, the most violent of the three.			Some pieces of rock were detached from a cliff.	Ditto.
19. In the Brettagne (Gri. Several shocks					Moniteur, 23 Mars; M. Studer's Catalogue.
Mar. 19. Beaumont, Vancluse; At Beaumont several great. At Avignon, Apt, and the shocks. At Mar-				Much damage was done to buildings, for the repair of which Napoleon gave 12,000 francs by	Journ. de l'Empire, 4 Août; Statistique des Bouches-du-Rhône;

midnight.	The village of Beaumont seems to have been the centre of disturbance. Also at Marseilles.	the motion continued until April, or according to M. Guérin, until May 30, another shock of note occurring on the 26th March, the day of the Caraccas earthquake.	
1812. Mar. 22. About 3 A.M.	Rome	An undulatory shock, the most severe felt for some time, from W. to E., not from N. to S., as was at first stated. Lasted twenty-five seconds. There had been a slight oscillatory movement at 11 ^h 30 ^m P.M. on the 21st, and a similar one followed at 4 A.M. on the 22nd.	.....
— 26. 4 ^h 7 ^m P.M.	Caraccas, and the surrounding country. The earthquake extended over the provinces of Venezuela, Varinas, Maracaibo, and particularly in the high mountains of Merida, in New Grenada, and as far as Carthagena in the Andes; on a line from E.N.E. to W.S.W.	The first shock lasted five or six seconds, and was immediately followed by a second of ten or twelve seconds. Then a movement in a perpendicular direction, followed by rather more prolonged undulation. The shocks were from N. to S. and from E. to W., and of the greatest violence. They recommenced on the 27th, and fifteen shocks	Felt on board ships in the port of La Guayra as if they had been on the rocks.

Accompanied by a noise like thunder. The atmosphere was calm, and cloudy. Considerable damage was done.

The Moniteur, 5 Avril; Journ. de l'Empire, 6, 7 et 8 Avril; Gentleman's Magazine, vol. lxxxii. pt. 1. p. 475.

Accompanied by a noise louder than thunder. Caraccas was utterly ruined by this terrible earthquake. The earth at that place appeared like the surface of a boiling liquid. At Valencia an immense torrent of water burst forth, and the lake of Maracaibo was lowered. Large masses of rock were detached and hurled down from the mountains. The sky was clear, and the night calm and beautiful. The preceding day had been extremely hot. Not a drop of rain had fallen for five months.

The shocks were more violent in the Cordilleras, of gneiss and mica-slate, than in the plains. They were very slight in the valleys of Aragua between Caraccas and San-Felipe and at Nueva-Barselona; and at Coro, a town situated amongst others which were injured, they were not felt at all. The towns that

v. Humboldt, Voyages, liv. v. ch. 14. et t. v. p. 295; Annual Register, 1812, p. 39; Moniteur, 25, 30 Mai, 4, 30 Juin, 2 Juillet, 8 Août, 28 Sept.; Journ. de l'Empire, 24 Mai, 3 et 9 Juin; Ann. de Chim. et de Phys. t. lii. p. 189, t. lviii. p. 83.

1.	2.	3.	4.	5.	6.
1-12. Mar. 12. 11.10. P.M.		One earthquake during the month.		were ruined are said to have been thrown down like houses of cards. The shocks of the 27th were accompanied by very loud and prolonged noise. On the 5th of April the ground was in a state of undulation for several hours. On the 24th April the first eruption since 1718 of the volcano of St. Vincent commenced. The noise from it was heard at Caraccas and the country about on the 30th, conveyed, as v. Humboldt supposed, through the earth.	Pouqueville, <i>loc. cit.</i>
Apr. 1. 1. 10. 4. 0.3 Caraccas				The vessel trembled as if upon a reef	Tilloch's Magazine, vol. lxvii. p. 149.
May 1 In Gloucestershire		Direction W. to E.		Accompanied by a noise like thunder	Gentleman's Magazine, vol. lxxxii. pt. 1. p. 479.
6. 20 P.M.					Moniteur, 30 Mai.
6. 15 A.M. Italy.		A strong undulatory shock from S. to N. lasting some secs.			
11 A.M.	Am ... a large part of the depart. Loire Inférieure.	A shock of two seconds' duration.		Some chimnies, &c. thrown down.	Ditto, 14 Mai; Journ. de l'Empire, 15 Mai.
13. Zwickau near Cologne.	Two shocks, with an interval of a minute.			Articles of furniture and some old walls were thrown down.	Journ. de l'Empire et Moniteur, 28 Mai.
Between 1 A. extending no further than within a radius of two leagues.		The first was the most severe, and lasted two seconds.			
2 A.M.		An earthquake			Journ. de l'Empire, 16 Juin, 1813.
Judenburg in Styria					
End of this month or beginning of June.					
5. June 5. Melidola, in depart. of Rubicon, Italy.		A slight shock.		<i>As always happens in this district, no damage was done.</i>	Moniteur, 23 Juin.
10. 48 ^m P.M.				The Annual Register gives the date June 24 ...	Ditto, 13 Juillet; Annual Register, 1812, p. 88.
23. Marseilles		An earthquake supposed.	The sea retired, leaving the port dry, and rushed in again with		

A.M.	DATE	EARTHQUAKE COLUMN	EARTHQUAKE COLUMN	EARTHQUAKE COLUMN	EARTHQUAKE COLUMN
4 A.M.	17. Kander and Mulheim in the Upper Bragan.	at this place.	Accompanied by subterranean noise. A chimney was thrown down.	Journ. de l'Empire, 4 Août; Moniteur, 1 et 11 Août.	
8 ^h 45 ^m A.M.	23. Pignerol	A shock apparently from E. to W.	A rather severe shock.	Journ. de l'Empire, 4 Août.	
About 9 P.M.	26. Waradin, Impenushitz, and Agram, in Croatia.	A single shock	Accompanied by thunder and wind. Some walls were broken.	Moniteur, 1 Sept.	
2 A.M.	27. Waradin	Another, more severe.	Ditto.	Ditto.	
Aug. 22	Bex, and Aigle, in the Canton du Val d'Aoste.	Lasted two or three seconds.	Several houses were injured	Moniteur, 11 Sept.; Journ. de l'Empire, 12 Sept.	
About 3 ^h 30 ^m A.M.	Sept. 11. Florence and its environs.	Several shocks during the day and following night. They were frequent until the 14th.	The weather was very variable at Naples	Moniteur, 23 Sept.; Journ. de l'Empire, 25 Sept. et 1 Oct.; Annual Register, 1812, p. 114.	
About the middle of the month.	In the island of Ischia.	A slight shock.	At Koblenz a bell was caused to toll. At Treviso a mountain was cleft, and part fell on the following day. At Treviso several houses were violently shaken.	Moniteur, 19 Oct.	
7 ^h 55 ^m A.M.	Oct. 26. In Bavaria and the Tyrol, extending to Treviso in Lombardy. A very large district was shaken.	At Innsbruck the shock lasted nearly a minute. At Treviso the direction was to the S. and N.W.	At Treviso several houses were violently shaken.	Moniteur, 8, 11, 16, 18, 21 et 26 Nov.; Journ. de l'Empire, 10, 16, 17 et 25 Nov.	
Nov. 10.	At Nuremberg.	Several shocks.	Almost all the houses were injured	Moniteur, 18 Nov.	
Night 3 & 4.	Kingston in Jamaica	A shock of forty seconds' duration.		Ditto, 26 Janv. 1813.	
9 Oct. 10 m.					
9 Oct. 10 m.					

1.	2.	3.	4.	5.	6.
		were felt daily up to the 5th April, when another earthquake occurred nearly as violent as the first.		were ruined are said to have been thrown down like houses of cards. The shocks of the 27th were accompanied by very loud and prolonged noise. On the 5th of April the ground was in a state of undulation for several hours. On the 24th April the first eruption commenced. The volcano of St. Vincent commenced. The noise from it was heard at Caracas and the country about on the 30th, conveyed, as v. Humboldt supposed, through the earth.	
Mar.	Jamaica in Ejdrus....	One earthquake during the month.			Pouqueville, <i>loc. cit.</i>
Apr. 1	At sea, off Caracas....			The vessel trembled as if upon a reef	Tilloch's Magazine, vol. liv. p. 148.
May 1.	In Gloucestershire....	(Direction W. to E.)		Accompanied by a noise like thunder	Gentleman's Magazine, vol. lxxii. pt. 1. p. 479.
— 2	Potenza in the Basilicata.	A strong undulatory shock from S. to N. lasting some secs.			Moniteur, 30 Mai.
— 3 rd A.M.	Italy.				
—	Nantes and a large part of the depart. Loire-Inférieure.	A shock of two seconds' duration.		Some chimneys, &c. thrown down....	Ditto, 14 Mai; Journ. de l'Empire, 15 Mai.
— 13	Zepeda, near Cobagua, extending no further than within a radius of two leagues.	Two shocks, with an interval of a minute. The first was the most severe, and lasted two seconds.		Articles of furniture and some old walls were thrown down.	Journ. de l'Empire et Moniteur, 28 Mai.
—	Judenburg in Styria	An earthquake			Journ. de l'Empire, 16 Juin. 1813.
of this th or be- of June.]					
June 5	Meklaia, in depart of Rubicon, Italy.	A slight shock....		<i>As always happens in this district, no damage was done.</i>	Moniteur, 23 Juin.
18 th P.M.	Rubicon, Italy.	The sea retired, leaving the port dry, and rushed in again with supposed.		The Annual Register gives the date June 24 ...	Ditto, 13 Juillet; Annual Register, 1812, p. 88.
— 23.	Marseilles....				

17. Kander and Mulheim in the Upper Brisgau. 8 ^h 45 ^m A.M.	at this place. A shock apparently from E. to W. A rather severe shock.	Accompanied by subterranean noise. A chimney was thrown down. Preceded by an explosion like a distant clap of thunder.	Journ. de l'Empire, 4 Août; Moni- teur, 1 et 11 Août. Journ. de l'Empire, 4 Août.
26. Waradin, Impensnitz, and Agram, in Croatia. About 9 P.M.	A single shock	Accompanied by thunder and wind. Some walls were broken.	Moniteur, 1 Sept.
27. Waradin	Another, more severe.		Ditto.
Aug. 22. Bar, and Aigle, in the Canton du Valais. About 3 ^h 30 ^m A.M.	Lasted two or three seconds.		Moniteur, 11 Sept.; Journ. de l'Em- pire, 12 Sept.
Sept. 11. Florence and its envi- rons.	Several shocks during the day and following night. They were fre- quent until the 14th.	Several houses were injured	Moniteur, 28 Sept.; Journ. de l'Em- pire, 25 Sept. et 1 Oct.; Annual Register, 1812, p. 114.
About the middle of the month. Oct. 25. 7 ^h 55 ^m A.M.	In the island of Ischia.	The weather was very variable at Naples	Moniteur, 19 Oct.
In Bavaria and the Tyrol, extending to Treviso in Lombardy. A very large district was shaken.	At Inspruck the shock lasted nearly a mi- nute. At Treviso the direction was to the S. and N.W. At Treviso the dura- tion of the shock four or five seconds (or, according to the Moniteur, 4 or 5 minutes). In other places two shocks were felt.	At Eohendorf a bell was caused to toll. At Treviso a mountain was cleft, and part fell on the fol- lowing day. At Treviso several houses were valently shaken.	Moniteur, 8, 13, 16, 19, 21 et 26 Nov.; Journ. de l'Empire, 10, 16, 17 et 25 Nov.
Nov. 3 & 4. Night 3 & 4 between 10 and 11 P.M.	At Wurenberg.		Moniteur, 16 Nov.
Kingston in Jamaica	A shock of forty se- conds' duration.	Almost all the houses were injured	Ditto, 26 Janv. 1813.

1.	2	3.	4.	5.	6.
Nov. 12. Jamaica	Three shocks together, lasting 30 secs.	The sea was much agitated.	Probably the same as the last account		Gentleman's Magazine, vol. lxxviii. pt. I. p. 80.
— 18. Bonn on the Rhine	A shock lasting two or three seconds.				Journ. de l'Empire, 25 Nov. et 1 Dec.; Montieur, 28 Nov.
— 19. A.M. In the neighbourhood of two shocks...			Some persons on horseback were thrown.		Ditto.
— 19. A.M. the Sicelengbache, close to Bonn.					Journ. de l'Empire, 24 Dec.
Dec. 3. Foglia, in the kingdom of Naples.	A rather severe shock.				Ditto, 16 Janv. 1813.
— 13. Oberthalbstein in the Grisons.	A slight shock.				Ditto.
— 14. Ditto	Ditto				Ditto.
4. During Portsmouth earthquake	A violent shock				Philos. Magazine, 1825, Jan. p. 70.; Ferrasac, Bull. des Sc. Nat. t. vi. p. 186.
Jan 16. In Sicily	Two vibrations		Accompanied by a strong smell of arsenic; during a sudden squall		Ann. de Chim. et de Phys. loc. cit.
Feb. Bucharest in Wallachia	Three rather severe shocks. The motion was horizontal, from N.W. to S.E.		Accompanied by loud subterranean noise. Walls were cracked.		Walls Journ. de l'Empire, 13 Mars.
Mar. 7. Macerata in the States of the Church.	A shock lasting four seconds.				Montieur, 29 Mars; Journ. de l'Empire, 31 Mars.
April 1. Ancona	Slight shocks daily during this period.				Journ. de l'Empire, 3 Mai; Montieur, 4 Mai.
— Janina	Earthquakes on two days during the month.				Ponqueville in Ann. de Chim. et de Phys. t. xiv. p. 408.
May 5. Presburg in Hungary	Two slight shocks at the hours mentioned.				Journ. de l'Empire, 28 Mai; Montieur, 27 Mai.
— Janina	One earthquake during the month.				Ponqueville, loc. cit.
June 3. Eidenburg in Hungary.	Two rather severe shocks.				Journ. de l'Empire, 16 Juin; Montieur, 17 Juin.

9 ^h 30 ^m A.M.	and the surrounding district.		all Germany.	
1813. June 19.	Naples	A slight shock.....	Less perceptible on hills than in the plain	Moniteur, 14 et 17 Juillet.
9 ^h 30 ^m P.M.	Rosas in Catalonia, Spain	A violent earthquake.	A rumbling noise proceeded from the interior of the earth. Preceded by a terrible storm.	Journ. de l'Empire, 1 Août; Moniteur, 2 Août; Palassou, Mém. pour serv. à l'Hist. Nat. des Pyrénées, p. 272.
July 18.				
5 ^h 10 ^m P.M.				
—	Kingston, Jamaica	A violent shock of earthquake, but of short duration.	Accompanying a dreadful tempest, which began by heavy rain.	Moniteur, 10 Juillet, 1814.
—	Janina	Earthquake shocks on nine days during the month.	.....	Pouqueville, <i>loc. cit.</i>
Aug. 7.	Watsborg in Carinthia.	At Watsborg several shocks, lasting eight or ten seconds. Direction N.W. to S.E. At Laybach three shocks, one of which lasted more than 3 secs. The motion was oscillatory at Brunsee.	Preceded at Watsborg by a dreadful tempest at 7 P.M. the evening before. More strongly felt on the mountains than in the plain. At Laybach the shock of three seconds was accompanied by a dull rumbling sound, like the rolling of a carriage in the distance. The day had been very hot, and the evening was very stormy. Heavy rain fell at the moment of the shocks.	Moniteur, 21 Août, 1 et 8 Sept.; Journ. de l'Empire, 21 Août et 23 Sept.
At Watsborg 0 ^h 45 ^m A.M.	Also felt at Laybach and in Styria.			
At Laybach 1 A.M.				
—	Irkutsk	Two shocks, together lasting 40 seconds.	Preceded by a subterranean noise. The sky was serene; the barometer at 28.5 in., the thermometer at 14° Reaum.	Mém. de l'Acad. Imp. de St. Pétersbourg, t. vi. p. 48.
—	Janina	Shocks on four days during the month.	.....	Pouqueville, <i>loc. cit.</i>
Sept. 6.	Buda, Pesth, and at Stuhlweissenburg.	A very perceptible shock.	Some damage done at Stuhlweissenburg	Moniteur, 8 et 10 Oct.; Journ. de l'Empire, 10 Oct.
9 ^h 33 ^m A.M.	Marseilles	Vibratory.....	.....	Statistique des Bouches-du-Rhône.
10 ^h 30 ^m A.M.	Teneriffe	Threeshocks, of which the first and principal lasted three-quarters of a minute.	The origin seemed to be in the Peak of Teneriffe.	Annual Register, 1813, p. 81; Tilloch's Magazine, vol. xlii. p. 316.
11 ^h 30 ^m A.M.				

1.	2.	3.	4.	5.	6.
1813, Sept 21. 8 ^h 40 ^m A.M.	Amola in the States of the Church.	A strong shock from N.W. to S.E., ac- companied by un- derlatory motion for 10 or 12 seconds. Other slight shocks...		Buildings were much injured.	<i>Journ. de l'Empire</i> , 5 et 11 Oct.; <i>Moniteur</i> , 13 Oct.
1 ^h 45 ^m P.M.	Forli				
3 P.M.	Ditto				
1 ^h 45 ^m A.M.	Rundess, Marinsbruck, and in the Lower En- gaden, Grisons.	Two successive slight shocks.		The sun appeared with a pale colour. Tremor shocks did much damage at Pavia. During thunder and rain	<i>Moniteur et Journ. de l'Empire</i> , 21 et 23 Oct.
3 ^h 30 ^m A.M.	The whole valley of Coire, Grisons.	An earthquake.			Ditto.
24. In the evening.	Stamford, Peterborough, &c. Janina	Lasted two seconds. Earthquakes on three days during the month. Two more slight shocks at the hours mentioned. Another shock			<i>Benard's Magazine</i> , vol. xxxviii pt. 2, p. 301. <i>Proquartier</i> , loc. cit.
Oct. 6. 9 ^h 45 ^m and 10 ^h 2 ^m A.M.	Forli in the Romagna...	Two more slight shocks at the hours mentioned. Another shock			<i>Journ. de l'Empire</i> , 18 et 20 Oct. et 5 Nov.
In the morn- ing— 9.	Ditto	Two more shocks			Ditto.
10 A.M. and 11 P.M.	Ditto	Four more shocks. The first was violent and rather long. Two more shocks One earthquake du- ring the month. A severe shock			Ditto. <i>Proquartier</i> , loc. cit.
Night between 16 and 17.	Ditto				
18.	Janina				
Dec. 15. 1 A.M.	Pisa			Three blows were struck on the bell of a public Communion of St. Peter, St. M. Peter.	
20.	East Hadden, Connecticut.	The last of the shocks			

1813. Dec. In Epirus.....	An earthquake .....	.....	Accompanied by a storm of thunder and lightning, which extended from Janina to the island of Corfu. Sorachovitzas was almost entirely overthrown by the earthquake.	Pouqueville, <i>loc. cit.</i> and Voyage en Grèce, t. i. p. 431.
1814. Jan. 21. 7 ^h 35 ^m A.M. Alençon in the departm. Orne.	A rather strong earthquake shock, consisting of a triple undulatory motion, from the exterior angles (of the houses?) to the centre, and lasting nearly a second in the direction S. to W.	.....	Accompanied by a low noise like that produced by air bursting thin vessels in which it had been compressed. The magnetic needle inclined towards the centre of the earth (the dip increased?), and the barometer, which had been at "Much Rain," altered seven degrees (tenths?) towards "Change," on the moment. It had snowed all night, but after this earthquake the weather was fine and very calm.	Moniteur, 28 Janv.
23. 7 ^h 15 ^m A.M. Mans in the departm. Sarthe.	Two shocks, the second of which was very violent.	.....	The second shock was accompanied by a very loud explosion. During the night of the 26th of this month, a little island in the Archipelago, known to the Turks as Solomon's Isle, disappeared. The night was calm, with scarcely a breath of wind.	Journ. de l'Empire, 28 Janv.; Moniteur, 28 Mai.
Mar. 8. 11 ^h 13 ^m P.M. Nantes	A rather severe shock, lasting 15 or 20 seconds. Direction N. to S.	.....	Accompanied by a noise like that of a cart laden with planks. The air was highly charged with electricity; some articles which chanced to be slightly rubbed, yielded sparks. Just before the shock the barometer fell suddenly to "Stormy," and the thermometer rose in a few minutes from -2° to +3°. Thunder and lightning followed the shock, but the serenity of the atmosphere was soon restored.	Moniteur, 16 Mars.
19. 9 P.M. La Chatre in the departm. Indre.	A violent shock, lasting 12 or 15 secs. Direction S.S.E. to W.N.W. (?)	.....	Preceded by two luminous meteors, and accompanied by a noise like that of a vehicle on pavement.	Journ. de l'Empire, 29 Mars.
April 3. 3 ^h 45 ^m A.M. Leghorn and Pisa	At Leghorn a strong undulatory and oscillatory shock, lasting 20 seconds after the noise.	.....	Accompanied at Leghorn by a terrible noise, which awakened every one. No damage was done here, but at Pisa some buildings were injured. The atmosphere at the latter place was calm and warm, and the light of the sun appeared dim during the day.	"Notizie estratte da un Giornale manoscritte del Dot. Vivoli," communicated by Signor Pilla to M. Perrey.
Leghorn	A slighter shock .....	.....	.....	Ditto.

2.	3.	4.	5.	6.
Apr. 28 Inspruck A.M. May 7. Pesth and Ofen in Hun- gary.	Two severe shocks from W. to E. Several shocks		Several houses were injured	Journ. des Débats, 12 Mai. Moniteur, 1 Juin.
— 10. Ditto — Teganuog on the Sea of Azov.	Ditto An earthquake		Near the town a little island, about half-a-verse in circumference, made its appearance, but was afterwards destroyed again by the waves. A violent submarine eruption took place this day at about 2 P.M., on the coast of Kamtschatka.	Ditto. Dubois de Montpéroux, <i>loc. cit.</i> t. v. p. 32; Eyries, <i>Nouv. Ann. des Voyages</i> , t. xxix. p. 109; D'Aubuisson, <i>Traité de Géog.</i> t. i. p. 427.
— 22. Marmande, Aiguillon, and Claire, in the departm. Lot et Garonne.	A shock from E. to W., lasting 2 seconds.			Moniteur, 7 Juin.
— 0 th A.M. Jaccan Spain.	A long and violent shock.		Masses of rock were detached from a mountain near Oléron.	Ditto, et 9 Juin; Tilloch's Magazine, vol. xliii. p. 463; Palassou, <i>loc. cit.</i>
— ... In Jamaica	A slight earthquake.			Moniteur, 19 Juillet.
June ... Janina	One earthquake during the month.			Ponquerille, <i>loc. cit.</i>
Sept. 1. At the parsonage of Salt-dalen in Sweden, and the neighbourhood.	An earthquake of greater violence than the one of August 31, 1819.			Rigatiunde for 1819, No. 83, Keilhan.
— 2. Ditto	Two slighter shocks.			Ditto.
— ... Near Alsais in the departm. Gant.	No actual shock mentioned. Perhaps not an earthquake.		Loud explosions like the discharge of artillery were heard at intervals for 24 hours, then a great detonation, followed by the sinking of a part of a field of corn. A peasant felt the ground moving under his feet, and saved himself just before the pit formed. The bottom was of clay with interpersed flints, and contained some water. The size of the opening left was 35 metres in diam. by 13 in depth.	Journ. des Débats, 24 Sept.
Before Comorn in Hungary	Several earthquakes during the year.			Moniteur, 21 Sept.
Oct. 9. Kingston in Jamaica, and its neighbourhood.	A violent vibratory shock.			Ditto, 11 Déc.

3. In Sicily, in the neighbourhood of a mountain named Zonolero, and of the Tempa-della Basile.	Two severe shocks from W. to E.			A sudden eruption of ashes took place on this day from a part of the mountain mentioned. The phenomenon was not preceded by any noise, but was followed by an earthquake (perhaps not on the same day?).	Ann. de Chim. et de Phys. t. xli. p. 400.
6. At Lyons, and along the whole line from Mâcon to Vienna.				Preceded by a loud explosion without any lightning. Much rain fell before and after the shocks. Some houses were thrown down, and boats were dashed against one another.	Journ. des Débats, 14 Nov.
Janina	Shocks on three days during the month.				Pouqueville, loc. cit.
Troitsko-Sarka and Kiselets in Siberia.	An earthquake similar to that of 1829, but less severe than that of 1792.				Férussac, Bull. des Sciences Naturelles, t. xxi. p. 60.
Janina	Shocks on one day of this month.				Pouqueville, loc. cit.
Agén and in the department of Lot-et-Garonne.	Several shocks.				Journ. des Débats, 23 Avril.
Toulouse	One shock			During this month an eruption of the greatest violence took place in the island of Sumbawa, in the Eastern Archipelago. The effects were terrible, and extended more or less over the whole of the Moluccas and neighbouring islands.	D'Aubeisson, Géologie, t. i. p. 200.
Janina	One earthquake during the month.				Pouqueville, loc. cit.
Iceland, especially in the northern part, in the district of Rafna.	Ditto			Earthquakes are said to be of frequent occurrence in the district of Rafna.	Eyriæ, Abrégé des Voyages Modernes, t. vii. p. 175; Voyage en Islande.
July 6. Mt. Stasi, one of the mountains separating Lombardy and Germany.	Two or three shocks.			Accompanied by a little hail and a north-east wind. Snow fell during the following night.	Bibl. Brit. t. lx. p. 391. (partie "Sciences et Arts").
Florence	A severe shock				Moniteur, 31 Août.
In Sicily	An earthquake				Ann. de Chim. et de Phys. loc. cit.
Naples	Some slight shocks in the direction S.E. (to N.N.W.?).				Moniteur, 9 Oct.

1.	2.	3.	4.	5.	6.
Sept. ...	Janua. ...	One earthquake during the month			Ponquerille, loc. cit.
Oct. ...	Ditto	Ditto			Ditto.
Nov. ...	Ditto	Shocks on two days during this month.			Ditto.
Dec. ...	Ditto	One day of this month.			Ditto.
Feb. 2. 0 ^m A.M.	Labon, and to the distance of 300 leagues to the west. Also felt in Madeira and in Holland.	At Lisbon a severe shock which lasted nearly a whole minute, or, according to others, 1½ or 3 minutes. The oscillations appeared to be from N.E. to S.W., and were followed by others of shorter duration at 6 ^h 45 ^m A.M.	Felt on board a ship 270 leagues W.S.W. from Lisbon (in 34° 15' N. lat. and 15° 16' W. long. from Lisbon). The first shock was at 0 ^h 46 ^m A.M. (Lisbon time), and produced the impression that the ship had touched the bottom, the grating motion lasting more than two minutes. A second, of much less intensity, was felt at 6 A.M. (Lisbon time). On board another vessel, 120 leagues to the W.S.W. of Lisbon, strong shocks were felt at 0 ^h 42 ^m , lasting five or six minutes, at 3 ^h 40 ^m , for but two or three seconds, and at 5 ^h 57 ^m (all Lisbon time) for three minutes. Also felt on board an American ship between Madeira and the Azores.	At Lisbon the people quitted their houses. There had been a storm the day before, after which the weather was remarkably calm and sultry until the shock, which was succeeded by heavy rain. A meteor appeared immediately after the first shock. Flocks of birds filled the air, uttering the most discordant cries. The Annual Register gives 0 ^h 55 ^m and 7 ^h A.M. as the hours at Lisbon.	Garnier, Météorol. p. 116; Ann. de Chim. et de Phys. t. xi. p. 323. Journ. des Débats, 27 Fév. 3 et 10 Mars; Moniteur, 10 Mars; Annual Register, 1816, p. 22; Trenchard's Magazine, vol. lxxvii. p. 148.

b. 7. At St. Gall in Switzerland. A vibratory shock ...	land.	.....	.....	M. Studer's Catalogue.
1. Askaniya in Sweden.	.....	.....	.....	v. Hoff, Th. 2.
17. Sheffield, Nottingham, Doncaster, Lincoln, Derby, &c.	.....	.....	Accompanied by a noise like that of a rising tempest. Pictures, lustres, and bells were set in motion, and the body of a mangle was moved some feet upon its rollers.	Annual Register, 1816, p. 44; Moniteur, 1 Avril.
29. In the bailiwick of Minsk, in the country of the Don Cossacks.	.....	.....	.....	Moniteur, 29 Juin.
Island of Porto-Penang	.....	.....	.....	Gardner, Météorol. p. 117.
Mon. the A.M. of 15.	.....	.....	.....	M. Studer's Catalogue.
ly 2. Leuk and Zweisimmen, in the Simmenthal (Canton of Berne).	.....	.....	.....	Ditto.
5. Ditto	.....	.....	.....	Ditto.
Yverdon in the Canton du Vaud.	.....	.....	.....	Journ. des Débats, 10 Août.
28.	.....	.....	.....	.....
7. Mount Vesuvius	.....	.....	.....	Ditto, 3 Sept.; Moniteur, 4 Sept.
13. Inverness and the country for 100 miles round, including Aberdeen, Perth and other places in the north of Scotland; the centre of disturbance being apparently in Inverness-shire.	.....	.....	.....	Annals of Philosophy, vol. viii. p. 368; Tilloch's Magazine, vol. xlviii. p. 150.

2.	3.	4.	5.	6.
Sept. 7. Frascati in the States of the Church.	A slight shock		ing from it was rendered unusually muddy. Many people experienced a slight faintness and sickness. Dogs howled, and the birds were scared from their roosting places.	Moniteur, 27 Sept.
— 9. Montreuil in Canada	A severe shock			Journ. des Débats, 1 Janv. 1817.
— 16. Ditto	A second shock, of less violence than the former, lasted 30 seconds.			Ditto.
— 27. In Galicia, Spain.	A slight shock, the third felt during the year.			Ditto, 28 Nov.
— 30. Sciacca in Sicily	Several shocks.		Accompanied by subterranean noise.	Réussar, Bull. des Sci. Nat. t. iv. p. 8.
— In the district of Grandson, Canton du Vaud.	Two shocks. The second was very violent, especially in the hamlet of Corcelletes.		The second shock was accompanied at the hamlet of Corcelletes by a loud subterranean noise.	Bibl. Univ. de Genève, t. iv. Mars 1817, p. 244.
— On the island of Pantellaria, and in Sicily.	Shocks from S.W. to N.E., and therefore in the line of the volcanoes of this region.			Audot, Roy. de Naples, p. 321.
— 13. Somewhere in the Gulf Stream (!).				Tilloch's Magazine, vol. xix. p. 395.
— 15. At Payerne and several villages of the Canton du Vaud.	A violent shock			Journ. des Débats, 25 Janv. et 27 Mars.
— 17. Ouches in the valley of Chanouin.	One shock			Ditto; Tilloch's Magazine, vol. xix. p. 395.
— 19. Ditto	Ditto			Ditto.
— 20. Ditto	Ditto			Ditto.
— Alcover in Spain.				Tilloch's Magazine, loc. cit.
— 23. Limoges and Gueret	A slight shock.			Journ. des Débats, 6 Fév.

27. Mansfield in Nottinghamshire, and the surrounding villages.					Geateman's Magazine, vol. lxxvii. pt. 1. p. 268.
28. Maseo in China, and the country around.					Asiatic Journal, vol. iv. p. 302; Garnier, <i>Météorol.</i> p. 118.
2. Island of Madeira				Felt also at sea, on board vessels more than 200 leagues from the island.	<i>Ann. de Chim. et de Phys.</i> t. xix. p. 411; Garnier, <i>Météorol.</i> p. 118.
5. Maseo in China, and the country round.				Several slight shocks.	Asiatic Journal, vol. iv. p. 302.
11. Bâle in Switzerland				An earthquake	<i>Mérian.</i>
In the valley of Chamonix				Another shock	Tillich's Magazine, <i>loc. cit.</i>
13. Ditto				Ditto	Ditto.
14. Ditto				Ditto	Ditto.
11. Lyons				Ditto	Ditto.
Onches in the valley of Chamouni, and at St. Gervais.				Accompanied by a loud detonation. Furniture was thrown down, and arches were broken. The glaciers cracked, and at the same instant lightning was observed over Mont Blanc, and a sort of light on the opposite side of the valley. The sky was serene.	Journ. des Dèbats, 22 et 27 Mars, 5 et 17 Avril; M. Studer's Catalogue.
Lausanne, throughout the canton, and at Berne, Neuchâtel and Geneva. Also felt at Yverdon, at Thun and other places in the Emmenthal as far as Wynigen.				Several shocks during the space of a min. At Berne the motion occurred (at 9 o'clock) and was but feeble.	Ditto.

1.	2.	3.	4.	5.	6.
1817.					
7 A.M.	Quakes in the valley of Chamouni.	Another shock			Journ. des Débats, 22 et 27 Mars, 5 et 17 Avril; M. Studer's Catalogue.
10 ^h 50 ^m A.M.	Ditto	Ditto			Ditto.
11 A.M.	Ditto	Ditto			Ditto.
At noon.	Ditto	Ditto			Ditto.
2 ^h 10 ^m P.M.	Ditto	Ditto			Ditto.
11 ^h 20 ^m P.M.	Ditto	Ditto			Ditto.
5 ^h 50 ^m P.M.	14. Messina	A very violent shock.		Accompanied by a tremendous noise	Moniteur, 11 Avril.
	15. Quakes in the valley of Chamouni.	Another shock			Journ. des Débats, <i>loc. cit.</i> ; Studer; Tilloch's Magazine, <i>loc. cit.</i>
	18. In the part of Spain comprised between the two seas and the Pyrenees, from Santander to Taragona; and in the region between Palencia, Toledo, and the mountains of Cuenca. Most violent in the Rioja, between Logrono, the right bank of the Ebro, and the frontier of Navarre. In other parts of the Rioja, in Castille, Biscay, Arragon and Catalonia, the earthquake was but slight. Also felt at Lerida, Cova, Cienfuenigo, &c.	A very severe shock. At Madrid, however, it was felt but slightly, as also at Santander, Palencia, and Saragoza, and still less at Cuenca and Barcelona (where some people said that it took place half an hour later than the time here given). In Navarre, at Pampluna, and Albaracin it was rather severe. The shock seemed to come from the west. Throughout the Rioja it recurred twice with an interval of a quarter		The sky had been clear and serene until 10 ^h 30 ^m , but then became overcast; the sun disappeared, and a terrible obscurity began, with a cold and impetuous wind from the N.W., lasting until the shock took place. The latter was accompanied by rumbling subterranean noise. The buildings were much shaken, and chimnies, walls, and even some houses were thrown down. At Arnedo, Prejano, Arnedillo, Callahorra and Anrejo much damage was done. At Logrono everyone was thrown down. At Albaracin abundant hail followed the shock. The weather in Spain had been very variable for some months. A cold summer succeeded a winter so mild that the temperature was constantly 5 or 6 degrees above that of ordinary years, and in some places there had been a great drought for three months.	Journ. des Débats, 14, 17 et 25 Avril; Journ. des Débats, 6, 7, 11 et 13 Avril; Ann. de Chim. et de Phys. t. lxxv. p. 396; Tilloch's Magazine, <i>loc. cit.</i>
10 ^h 45 ^m A.M.					

1817. Mar. 18. 11 ^h 30 ^m A.M.	Throughout the district of the Rioxa only.	of an hour, but not elsewhere.	.....	.....	.....	Ditto.
3 P.M.	Ditto	.....	.....	.....	.....	Ditto.
11 P.M.	Ditto. On this same day oscillatory motion was observed at Pan, Ogenne, Dognen, Viellesegure, Oloron, and Bayonne, to the north of the Pyrenees.	Followed by others, up to the 27th. M. Gutierrez says that there were 116 shocks in three months about this time.	.....	.....	.....	Ditto.
22. 11 or 11 ^h 15 ^m P.M.	At most of the places shaken on the 18th.	According to some this shock was more violent; according to others, less so than that of the 18th.	.....	.....	.....	Ditto.
..... Night between 25 and 26.	Frascati, Genzano, and some other places in Italy.	Two shocks; the first of which was very slight, and the second very violent. Perhaps this account refers only to the second of the two shocks last mentioned.	.....	.....	.....	Journ. des Débats, 15 Avril; Tilloch's Magazine, loc. cit.
..... 26. Ditto	.....	.....	.....	.....	.....	Tilloch's Magazine, loc. cit.
..... 28. Onches in the valley of Chamouni.	.....	.....	.....	Accompanied by subterranean noise	.....	Ditto; Journ. des Débats, 5 et 17 Avril.
30. Ditto	.....	Ditto	.....	Ditto	.....	Ditto.
31. Ditto	.....	Ditto, very violent	.....	.....	.....	Ditto.
April 1. Ditto	.....	Another	.....	.....	.....	Ditto.
2. Ditto	.....	Very violent; from N. to S. (or S. to N.?)	.....	.....	.....	Ditto.
15. In Sicily	.....	An earthquake.	.....	Some damage was done	.....	Férussac, Bull. des Sci. Nat. t. iv. p. 9.
16. Appenzel in the canton of same name.	.....	A severe shock	.....	There had been a terrible storm the day before.	.....	Journ. des Débats, 28 Avril; Studer.
2 ^h 30 ^m A.M. ... At Naples, and about the same period at Palermo.	.....	Several shocks of considerable severity.	.....	At Palermo strange howling noises were heard in the air, and large spots were observed on the sun. A very great eruption of Etna was the cause of the shocks at both places.	.....	Moniteur, 17 Mai; Journ. des Débats, 16 et 21 Mai.

1.	2.	3.	4.	5.	6.
April... A place named Chang-Ruh, on the borders of the province of Szechuen, on the western frontier of China.	A violent earthquake.			Above 11,000 homes were thrown down, and more than 2800 persons killed.	Quart. Journ. of Roy. Inst. vol. vii. p. 191, quoting a Pekin Gazette of May 2.
May... June 10. Several places in Sicily. Urquhart, Dore, and near Inverness.	Several shocks. A smart shock.				Moniteur, 16 Jun. D. Milne on Earthquake Shocks felt in Great Britain; Edinburgh New Philosophical Journal, vol. xxi. p. 118.
— 16. Ditto	Two, similar to the last.				Ditto.
— 30. Inverness and neighbourhood.	Two very violent shocks.			Preceded by a storm and hot rain	Tulloch's Magazine, vol. ii. p. 193.
July 7. Schaffhausen, and at same hour at Porrentruy in the canton of Berne.	At Schaffhausen a rather severe shock, which was more violent a league from the town. At Porrentruy also the motion was stronger in the environs.				Moniteur, 30 Juillet; Journ. des D�bats, 28 Juillet; M. Studer's Catalogue.
— 11. Calcutta and the neighbourhood.	Shocks of trifling importance.				Garnier, <i>loc. cit.</i> p. 118.
Aug. 7. Urquhart, Dore, and near Inverness.	A slight shock, more severe to the west of the town.			The French authorities quoted give the date Aug. 17.	D. Milne's Catalogue of British Earthquakes, <i>loc. cit.</i> ; Moniteur, 5 Sept.; Journ. des D�bats, 4 Sept. M. Studer's Catalogue.
— 8. At the hospice of the Grimsel.					Ditto; Journ. des D�bats, 29 Sept.
— 11. Saanen or G�senay canton of Berne.	Severe shocks				Ditto.
— 13. Ditto. Rougemont, to the west of Saanen, is mentioned.	Ditto. These shocks recurred almost every day, but with less violence, until the middle of September, when some of great severity				

1851 1817. Aug. 19. About 5 P.M.	Innsbruck .....	..... A very severe shock.... du Vaud).	..... The sea in the neigh- bourhood of Vostitza was heated to such an extent, that the fishermen scalded their hands by dip- ping them into it.	..... A bell was caused to sound. The motion was stronger on the banks of the Inn than in the town.	Journ. des Débats, 3 Sept.; Moni- teur, 4 Sept.
— 23. About 8 A.M.	In the Morea, especially at Vostitza. But little perceptible at Corinth, but of remarkable in- tenaity at Patras and in Ellis.	Many and violent shocks, which did not cease for eight days.	..... The town of Vostitza was destroyed in seven- teen minutes, during a storm of opposite winds.	..... P. 559, t. iv. p. 413.	Journ. des Débats, 21 Nov. 1817 et 10 Janv. 1818; Mém. de Chro- nol. loc. cit.; Pouqueville, Voyage, t. iii. p. 559, t. iv. p. 413.
— 31. Sept. 2. 3 ^h 30 ^m A.M.	Urquhart, Dores, and near Inverness.	A smart shock.....	.....	.....	D. Milne's Catalogue, loc. cit.
— 22. 2 ^h 30 ^m A.M.	Inverness.....	Another rather severe shock, the fifth since the beginning of August.	.....	.....	Journ. des Débats, 24 Sept.; Moni- teur, 25 Sept.
— 22. 2 ^h 30 ^m A.M.	Angoulême in the de- partm. Charente.	Rather violent shocks, from N. to S., last- ing 2 or 3 seconds.	.....	..... A loud detonation was heard at the termination of the shocks.	Journ. des Débats, 7 et 22 Oct.; Moniteur, 10 Oct.
— ...	Madras.....	.....	.....	..... Earthquakes are said to be of extreme rarity at this place.	Garnier, loc. cit.
— Oct. 17. 3 P.M.	Yvonand in the Canton du Vaud.	A rather violent shock.	.....	.....	Journ. des Débats, 27 Oct.; Studer.
— 18. 10 ^h 30 ^m P.M.	In Sicily, at Catania and Cattaro.	A slight trembling ...	.....	.....	Ann. de Chim. et de Phys. loc. cit.; Bull. Univ. t. ix. p. 229.
— 21. 10 ^h 30 ^m P.M.	St. Helena	Several successive shocks, lasting alto- gether 2 minutes.	.....	.....	Gentleman's Magazine, vol. lxxvii. pt. 2. p. 622.
— 31.	Smyrna	A rather severe shock, which lasted several seconds, and was followed by others a little later.	.....	.....	Journ. des Débats et Moniteur, 28 Déc.
—	Macquarie Island in the S. Pacific.	Violent shocks, re- curring frequently during the re- mainder of 1817, and up to April 1818.	.....	..... Accompanied by subterranean noise	Garnier, loc. cit.

1.	2.	3.	4.	5.	6.
1817. Nov. 9	Parts of Yorkshire, Westmoreland, and Lancashire.				Gentleman's Magazine, vol. lxxxviii. pt. 2.
—	12. Geneva and the neighbourhood.	A severe shock. The direction was <i>from above downwards</i> (?) ?	The waters of the lake of Geneva were momentarily raised.	Accompanied by a loud detonation and noise like the fall of a very heavy body.	Journ. des Débats, 21 et 24 Nov.; Moniteur, 1 et 8 Déc.; Studer.
—	19. Longuéne near Saurur, in the departm. Maine-et-Loire.	A rather severe shock.			Journ. des Débats, 10 Déc.
—	20. Gadmen in the Bernese Oberland.	A trembling. About this time several shocks were felt in the same district.			Journ. des Débats, 21 et 24 Nov.; Moniteur, 1 et 8 Déc.; Studer.
—	22. In Greenland.	A severe shock		Hecla was perfectly quiet at the time	Quart. Journ. Roy. Inst. vol. v. p. 135.
At night.	Dec. 23. St. John in the island of Antigua.	Shocks of the most alarming character, lasting several secs.			Moniteur, 23 Fév. 1818; Journ. des Débats, 24 Fév. 1818.
1818. Jan. 9.	Hayfield in Sweden	One shock			Ann. de Chim. et de Phys. t. xxxiii. p. 402; Garnier.
8 ^h 9 ^m A.M.	Athens		Accompanied by an inundation of the sea.		Gentleman's Magazine, vol. lxxxviii. pt. 1. p. 71.
—	Feb. 6. Coningsby in Lincolnshire.	Slight. Lasted some seconds.		A subterranean noise like the firing of cannon was heard at this time. At the east of Holderness, and in the neighbourhood of Trentfall, 50 miles from Coningsby, the noise was also heard. At the first place the sound was like that of horses running away with a waggon; at the latter it resembled distinct gun-shots, and then died away to a sort of grumbling. It lasted about two minutes, and seemed to shift from E. to S.	Ditto, vol. lxxxviii. p. 1. p. 171; Quart. Journ. Roy. Inst. vol. v. p. 135; Ann. de Chim. et de Phys. t. ix. p. 433.
—	19. Rouffach, Soultz, and Belfort in the departm. Haut-Rhin.	A severe shock			Ann. de Chim. et de Phys. t. ix. p. 433; Journ. des Débats, 6 Mars; Journ. de Phys. t. lxxxviii. p. 35; Garnier.
10 ^h 30 ^m P.M.	Not felt at Colmar.				
—	In Aberdeenshire				D. Milne's Catalogue, loc. cit.

1818. Feb. 20. Coningsby in Lincolnshire and the country round. Felt also at Kirton in Lindsey.

At Catania, and in Calabria and Malta.

7^h 10^m P.M.

A severe shock, followed by another of less intensity, during the night. The motion was from S.E. to N.W., according to some oscillatory, and lasted, by varying accounts, from 10 to 40 seconds.

The sea was calm during the morning, but rose in froth upon the shore, owing to an unperceived (distant?) storm. At a place on the coast where the sea was tranquil, a vessel at anchor touched (or seemed to touch?) the bottom thrice with her keel.

Accompanied, as the former shock, by noises like the firing of cannon. At Kirton in Lindsey a meteor was seen about the size of a cannon-ball, with a luminous streamer behind it, and moving with great velocity.

The sky was clear, the air calm and mild. The moon was beautifully bright. Animals showed signs of alarm before the earthquake. Etna had been quiet since 1811, but at dawn this day flames were observed issuing from small cracks in the old beds of lava, accompanied by slight explosions. The water in wells was troubled some days before the shocks; and at a place named Paraspolo, fourteen considerable jets of salt water rose suddenly with a loud noise from the earth to the height of 6 palms. This phenomenon occurred five or six minutes before the shock, and lasted about twenty minutes. The apertures from which the water had issued were so hot two days afterwards that it was impossible to plunge the hand into them. Near the same place a subterranean noise like thunder was heard. The water in the basins of public fountains was in part thrown out at each shock. Some statues were remarked as having been moved a little in azimuth; and a considerable mass of stone at Syracuse was turned 25° from the east towards the south. The walls in some houses were seen to open *horizontally* (?), so that the light of the moon penetrated for an instant, and then closed again, without leaving very perceptible traces of fracture. In Catania great masses of stone were thrown from the tops of buildings, and a colossal statue of an angel lost both its arms, as if they had been cut sharply off. At many other places public and private buildings were thrown down, and 69 persons were killed or wounded. The atmosphere soon after became cloudy.

Ann. de Chim. et de Phys. t. ix. p. 433, t. xix. p. 435 et suiv., t. xxi. p. 402; Journ. des Débats, 26 et 31 Mars; Bibl. Univ. t. ix. Nov. 1818, p. 228.

Gentleman's Magazine, vol. lxxviii. pt. 1. p. 364.

1.	2.	3.	4.	5.	6.
Feb. 22 3 ³⁰ (A.M. M.).	Turin	A shock from N. to S.			Mém. de l'Acad. de Turin, t. xxiii. p. 397.
— 23.	Genoa and Milan	Two shocks			Ditto.
	Turin, Genoa, Savona, Alanco, and San Remo.	At Turin there were two shocks; at the other places they continued at inter- vals for two days.		During a storm which raged this day over Pro- vence and the north of Italy. At some towns several houses were injured.	Quart. Journ. Roy. Inst. vol. v. p. 134.
—	Marseilles, Draguignan, Oreille in Savoy, An- tibes and Venice in the departm. Var.	At the first three places the shocks were very severe, and from N.W. to S.E. At Antibes there were three oscillations from S.E. to N.W. in 3 seconds.	At Antibes the sea dashed violently against the rocks just before the shock.		Ditto; Ann. de Chim. et de Phys. t. ix. p. 433, t. xxiii. p. 402; Journ. des Débaux, 6 et 12 Mars; Moniteur, 12 Mars; Journ. de Phys. t. lxxviii. p. 33.
—	Antibes	Another shock ..			Ditto.
—	Marseilles, St. Remi (Bouches-du-Rhône), and in part of the de- partm. Var.	Ditto. On this day, and the following several shocks were felt in the Var.			Ditto.
—	Antibes	Another shock ..			Ditto.
—	In the Madones (Sicily).	Shocks began on this night which con- tinued from time to time until April 1819. The most considerable were these first shocks and those of the 8th Sept.		Preceded by the same smothered rumbling noise as before.	
—	Felt over a very limited district. The centre of disturbance seemed to be in the neighbour- hood of Petrol and Po- lizzi.			Cracks opened in buildings at Genoa and some other places, and here and there considerable damage was done.	Bull. des Sc. Nat. t. v. Juil. 1825, p. 317.
—	Vence, Marseilles, and Aix.	A slight shock			Ann. de Chim. et de Phys. 2 ^e série, t. vi.

1 ^h 15 ^m P.M.	Catania	Two more shocks .....		.....	Did great damage	Ditto, t. xxxiii. p. 402.
— 27.	Ditto	Shocks were supposed to have been felt.		.....	During a tempest comparable to that of 1786....	Ditto, and other authorities quoted above. Journ. des Débats, 21 Juin.
Night between 28th Feb. and 1st March.	The Mauritius	A slight shock .....		.....	.....	Ann. de Chim. et de Phys. t. xxxiii. p. 402; Garnier.
March 1.	St. Remy in the Puy-de-Dôme.	Ditto. Lasted 4 secs.		.....	.....	Ditto.
— 2.	In the departm. Var, and at Nice.	Followed by three oscillations after an interval of 8 secs.		.....	A column of smoke rose at the same time from Mount Etna.	Ditto.
— —	In the Val-di-Noto, Sicily.	Rather severe shocks.		.....	.....	Ditto, p. 403.
9.	St. Remy. (In the Puy-de-Dôme, in the Bouches-du-Rhône, or S.W. of Savona?)	Another slight shock.		.....	.....	Ditto.
15.	Ditto	Ditto .....		.....	Very little damage done.....	Quart. Journ. Roy. Inst. vol. vi. p. 168.
18.	Bencoolen in Sumatra	The effects of this earthquake were experienced at a considerable distance out to sea.		.....	This city of 70,000 inhabitants is said to have been entirely swallowed up in subterranean chaams, so that no traces of it remained. The account is manifestly exaggerated; but what foundation, if any, had it? The event is said to be announced in letters from Bucharest of the 17th March, but the date of the earthquake is not given.	Journ. des Débats, 11 Juin.
?	Philippoli in Romania	An earthquake .....		.....	The inhabitants left their houses	Ann. de Chim. et de Phys. loc. cit.; Quart. Journ. Roy. Inst. vol. v. p. 372.
April 8.	Commune of Latour in Piedmont.	A violent shock at the time mentioned, followed by four more; and, two hours after, by other slighter ones.		.....	
— April 18 ^m A.M.						

1.	2.	3.	4.	5.	6.
1818. April 9.	Commune of Latour in Piedmont.	Several slightershocks			Ann. de Chim. et de Phys.
— 30.	Ancona	A single shock of trifling importance.			Ann. de Chim. et de Phys. t. ix. p. 433.
—	Extending from one side of Lincolnshire to the other, and across Hol-derness in Yorkshire.	A smart shock.			D. Milne's Catalogue of British Earthquakes, <i>loc. cit.</i>
— May 3.	Ancona	A strong shock			Ann. de Chim. et de Phys. t. xxxiii. p. 403.
— 16.	Island of St. Thomas in the West Indies. The Moniteur says Ile de la Trinité, perhaps Trinidad.	A severe shock, followed by another at 9 ^h 30 ^m A.M. (9 ^h according to the Moniteur.)			Quart. Journ. Roy. Inst. vol. vi. p. 168; Moniteur, 8 Sept.
— 17.	Motz in Savoy	From S.E. to N.W.		Preceded by loud detonations. The sky was serene.	Ann. de Chim. et de Phys. t. xxx. p. 403; Garnier.
— 21.	Island of Martinique	A slight shock			Ann. de Chim. et de Phys. t. xxxiii. p. 403; Garnier.
— 28.	Brudeis (Budweis?), a little be- Kranau, Rosenberg, and fore mid-in the mountains between Bohemia and Austria.	Very violent shocks; most severe in the highest parts of the mountains.			Ditto; Gentleman's Magazine, vol. lxxxviii. pt. 1. p. 554.
— 31.	At Mexico	A severe earthquake.		Many of the public and other buildings of the city and neighbourhood suffered materially. Amongst others, a number of the arches of the aqueduct of Santa Fé were rent, and discharged quantities of water.	Ann. de Chim. et de Phys. t. xii. p. 425; Moniteur, 16 Nov.; Quart. Journ. Roy. Inst. vol. vi. p. 370.
— June 1.	Jamaica	A violent shock, felt throughout the whole island.			Ann. de Chim. et de Phys. t. xxxiii. p. 403, t. viii. p. 415; Garnier.
— 9.	Loch Awe, Scotland			Preceded by a loud rumbling noise	Tilloch's Magazine, vol. li. p. 467.
— 20 ^m P.M.					D. Milne's Catalogue of British Earthquakes, <i>loc. cit.</i>
— 19.	Comrie in Perthshire	Two shocks, with an interval of a minute.			Journ. des Débats, 1 et 8 Août; Moniteur, 2 Août; Ann. de Chim. et de Phys. t. ix. p. 433; Quart. Journ. Roy. Inst. vol. vi. p. 168.
— July 19.	Perpignan, Pau, and throughout the valley of Orthez.	Some shocks in the direction of the chain of the Pyrenees.		Said to be accompanied by heavy rain, and followed by great electrical explosions. Stormy weather was frequent after the shocks.	

1818. July 22. 10 P.M.	Innsbruck in the Tyrol..	A severe shock, from W. to E.; the oscillation lasting some seconds.	.....	Accompanied by a rolling noise like thunder ...	Ann. de Chim. et de Phys. t. ix. p. 433; Quart. Journ. Roy. Inst. vol. vi. p. 168.
— 27. 1 P.M.	Albano in Italy	A slight shock.....	.....	The Quarterly Journal of the Roy. Inst. gives the date August 27.	Journ. des Débats, 15 Août; Ann. de Chim. et de Phys. t. xxxiii. p. 403.
— 30. 4 ^h 44 ^m P.M.	Jassy in Moldavia	A violent shock, lasting some seconds. A second, of less violence, was supposed to have been felt about midnight. Severe shocks .....	.....	.....	Journ. des Débats, 10 Sept.; Moniteur, 12 Sept.; Quart. Journ. Roy. Inst. vol. vi. p. 169.
— End of the month.	At Mexico .....	.....	.....	.....	Ann. de Chim. et de Phys. t. xxxiii. p. 403.
— Aug. 3. 8 A.M.	Castiglione in Italy.....	A rather severe shock.	.....	.....	Gentleman's Magazine, vol. lxxxviii. pt. 2. p. 173.
— At night.	Rome, Albano, and Frascati.	Ditto .....	.....	.....	Ann. de Chim. et de Phys. loc. cit.
— Sept. 1.	In the island of Candia.	A severe shock .....	.....	.....	Ditto; Moniteur, 27 Oct.
— 8.	Inverness in Scotland.....	.....	.....	.....	D. Milne's Catalogue, loc. cit.
— 5 ^h 30 ^m (A.M. or P.M.?).	Cuneo in Piedmont	A shock of rather long duration.	.....	.....	Ann. de Chim. et de Phys. loc. cit.
— 11 ^h 30 ^m P.M.	Palermo. The shock seemed to be confined in extent to the city.	A severe shock .....	.....	.....	Ditto; Journ. des Débats, 6 et 8 Oct.; Moniteur, 9 Oct.
— 21.	Aleague and a half to the west of Lisbon, but not in the city itself (!).	A very violent shock.	.....	.....	Moniteur, 13 Oct.; Ann. de Chim. et de Phys. t. ix. p. 433.
Oct. 2. 1 ^h 30 ^m P.M.	Brutensorg, Batavia. Felt in the mountains as well as in Batavia.	A very smart shock, lasting but a few seconds.	.....	The houses were violently shaken, windows rattled, mortar fell from the walls, and bells rung. Some houses had the walls rent open. People who were standing up became giddy by the motion of the ground. The windows and furniture of the houses were shaken.	Quart. Journ. Roy. Inst. vol. vii. p. 396; Garnier.
— 11.	Along the base of the mountain to the north of Quebec.	.....	.....	.....	Quart. Journ. Roy. Inst. vol. vi. p. 370; Ann. de Chim. et de Phys. t. xii. p. 425.

1.	2.	3.	4.	5.	6.
1818. Oct. 31.	Dalton in Low Furness, Lancashire.	.....	.....	It is said that a shock was felt at the same place about a year before, and that such convulsions are not rare in the line of country which extends along the western coast from Lancashire to Ayrshire.	Quart. Journ. Roy. Inst. vol. vi. p. 370; Ann. de Chim. et de Phys. t. xii. p. 425.
— — — — —	In Iceland	A dreadful shock.....	.....	Accompanied by subterranean noises and horrid crashes, at the close of which an eruption from Mt. Hecla commenced.	Ditto.
— Nov. — Night between 4 & 5.	Aquisgrana (Aix-la-Chapelle). The same shocks were felt in the whole of the town of Wittenbach.	A shock of but little violence, followed, after sunrise, by a second, which was again succeeded in a few minutes by renewed motion.	.....	The last felt motion was accompanied by a noise like that of a distant cannonade.	Ann. de Chim. et de Phys. t. xxxiii. p. 403; Moniteur, 14 Nov.
— — — — — 0 ^h 20 ^m A.M.	Inverness, and to some distance round the town. Felt with great violence along the banks of Loch Ness.	Two shocks, in three seconds. Preceded on the evening of the 10th and succeeded the next morning by slighter shocks.	.....	Accompanied by a noise like thunder. Bells rang of themselves.	Gentleman's Magazine, vol. lxxxviii. pt. 2. p. 557; Ann. de Chim. et de Phys. t. xii. p. 425; Moniteur, 27 Nov.; Quart. Journ. Roy. Inst. vol. vi. p. 370.
— — — — — Before the 14th.	In the neighbourhood of Lisbon.	Several slight shocks had been felt for some time before the 14th.	.....	Occasioned much alarm	Moniteur, 12 Déc.
— — — — — 20.	Cap Henri in St. Domingo.	Two severe shocks ...	.....	Five persons were killed and some houses were destroyed.	Ann. de Chim. et de Phys. t. xxxiii. p. 403 et t. viii. p. 415; Moniteur, 18 Janv. 1819; Quart. Journ. Roy. Inst. vol. vii. p. 191.
— Dec. 7. 9 A.M.	Bangor in N. Wales, and, much more sensibly, in the neighbourhood of Penter.	Very slight at Bangor.	.....	At Penter the motion was described as being as if the earth had sunk nearly a yard under the feet. The Ann. de Chim. et de Phys. mentions another slight shock as felt at this place on the 14th at 9 A.M., but it is probably confounded with the event here recorded.	Quart. Journ. Roy. Inst. vol. vi. p. 371; Ann. de Chim. et de Phys. t. ix. p. 433 et t. xxxiii. p. 403.
— — — — — 8.	Parma, Genoa, Modena, At Parma the shock	At Parma the shock	.....	.....	Ann. de Chim. et de Phys. loc. cit.;

a. c.	9. Parma	The oscillations, from S. to N., lasted four- teen seconds.		A church fell	Ditto.	Ann. de Chim. et de Phys. t. xxxiii. p. 403, t. viii. p. 415; Cuvier, <i>Hist. des Sc. Nat.</i> t. ii. p. 169.
b.	10. Reggio	Another slight shock			Ditto.	
c.	20. Island of St. Domingo	A violent shock		From this month up to the 21st May 1819, eight earthquakes were felt in the Antilles, of which seven occurred between 9 and 11 P.M. The motion consisted as usual of gentle oscillations, without actual shocks.		
d.	Copjapo		Vessels at sea were very much agitated, so that the shock was supposed greater there than on land.	Several of the inhabitants fled into the country.	Phil. Trans. for 1836, p. 21. Ann. de Chim. et de Phys. t. xii. p. 426.	
e.	17. Ansmödt in the Osterdal, Sweden.	Began by a rolling motion from W. to E., which was fol- lowed by a shock of short duration.		In some places furniture was moved about and the glasses were caused to ring.	Regisstranden for 1819, Nr. 10.	
f.	24. St. Ubes in Portugal	Several slight shocks.				Ann. de Chim. et de Phys. t. xxxiii. p. 404; Quart. Journ. Roy. Inst. vol. vii. p. 191.
g.	29. Tiflis in Georgia	Several shocks, which became very violent at 10 o'clock.		Preceded by tempestuous weather and subter- ranean noises. The earth was rent in many places, and many old buildings were destroyed. Perhaps the event of the 28th February is only the same with this.	Quart. Journ. Roy. Inst. vol. vii. p. 397.	Silliman's Journal, vol. xxvii. p. 351.
h.	Tabriz in Persia	Very numerous shocks, extending over several weeks, about this time; the exact days not mentioned.				
i.	1. Parma	A slight shock.				Ann. de Chim. et de Phys. t. xxxiii. p. 404.
j.	8. Genoa	Violent shocks.		The towns of Port-Maurice and San-Remo were injured. The date should probably be Ja- nuary 8.		Huot, Géol. t. i. p. 114.

1.	2.	3.	4.	5.	6.
1819. Feb. 11. 5 P.M. At night.	Kilkenny in Glenlyon, Scotland. Palermo	A smart shock Several shocks. . . . .	.....	Immediately followed by a tremendous gale and much snow. During the fourteen days preceding the 4th of March the weather was dreadful, and three shocks of earthquake occurred.	Quart. Journ. Roy. Inst. vol. vii. p. 191. Ann. de Chim. et de Phys. t. xii. p. 426.
— Same night.	Near Morbio in the Can- ton of Ticino.	A trembling. . . . .	.....	.....	Ditto.
— 26.	Rome, Frascati, and Al- bano.	Shocks from S.E. to N.W. . . . .	.....	.....	Ditto.
— 28.	Tiflis in Georgia	Several shocks. . . . .	.....	.....	Ditto.
At night.	In Syria	Severe shocks . . . . .	.....	.....	Ditto.
Bad of the month	.....	.....	.....	.....	.....
— March 7	Kinabua on the frontiers of China.	A prolonged shock . . . . .	.....	.....	Ditto, t. xxiii. p. 404.
— 18.	Port Marlborough on the western coast of Su- matra.	A very violent shock . . . . .	.....	.....	Garnier, Météor. p. 123.
— 19.	Oran and Mascara, in Morocco.	Shocks lasting 20 hours. . . . .	.....	.....	.....
— April 3.	Copnapo in Chili	Very violent . . . . .	.....	.....	.....
— 4.	Ditto	Ditto . . . . .	.....	.....	.....
— 8.	Temeswar in Hungary	Three shocks . . . . .	.....	.....	.....
— 10.	Landshut and Augs- burg.	A slight shock. . . . .	.....	.....	.....
— 11.	Copnapo	The last of the three dreadful shocks of this month. . . . .	.....	.....	.....
— May 26. 6 P.M.	Corneto in the States of the Church. The shocks were felt along the Mediterranean.	.....	.....	.....	.....
— 27.	In Sicily	A violent shock . . . . .	.....	.....	.....

1819. May. In the neighbourhood of Viterbo.	.....	.....	.....	Doubtless the same with those at Corneto on the 26th.	Transactions of the Literary Society of Bombay, vol. iii. p. 90.
June 16. Cutch, and other parts of the north of India, including a space of about 18° lat. by 20° long. Extended north as far as Ahmedabad, where much damage was done. Also slightly felt at Poona.	.....	.....	.....	The violence of this remarkable earthquake was so great that people could scarcely keep their feet, and the waving motion of the ground was quite visible. The earthquake was accompanied by a violent gust of wind and a noise like that of a large flight of birds. Many meteors or falling stars were observed on the night after. Many other shocks occurred during the night, and at intervals until the 23rd of November. The whole district of Cutch was ravaged, and Bhooj, the capital, was changed to a heap of ruins, 2000 of the inhabitants perishing. Many other towns and villages suffered much. The most remarkable effects of this earthquake were the subsidence of "Sindree" and elevation of the "Ullah Band," for details of which see Lyell's 'Principles of Geology'.	Asiatic Journal, vol. ix. pp. 70, 79, 184, 307, 310, 384; Quart. Journ. Roy. Inst. vol. viii. p. 266, vol. ix. p. 206; Lyell, Geol. p. 437.
9 ^h 30 ^m P.M.	Calcutta, Muttra, Chunar, Mirzapora, Mynpoore, Jhonpoor, Sultanpoor, Surut, Broach, Kaira, &c.	Two shocks with an interval of about two minutes. The first lasted thirty or forty seconds. At Jhonpoor there were three distinct sensations from W. to E., lasting twenty-five seconds. At Sultanpoor the shock was very awful.	.....	.....	.....
17. Ditto	.....	Another shock	.....	.....	Ditto.
18. Ditto	.....	Two ditto	.....	.....	Ditto.
20. Ditto	.....	Two more shocks	.....	On this day the volcano called Demodur, thirty miles N.W. from Bhooj, is said to have burst into eruption, and the convulsions ceased. The eruption of Etna continued, but with so much smoke that no flame was visible.	.....
July. Night between 1 st and 2 ^d .	Catania; felt still more strongly at Chiaramonte.	very severe shock	.....	.....	so Journ. des Débats, 11 Août.

1.	2.	3.	4.	5.	6.
1819, July 10. 6 ^h 43 ^m P.M.	Guérande in the depart- ment of Loire-Inférieure.	A slight shock from N. to S.		Accompanied by noise like prolonged thunder.	Journ. des Débats, 24 Juillet; Ann. de Chim. et de Phys. t. xii. p. 426. Ann. de Chim. et de Phys. t. xxiii. p. 404.
28	Munch	A severe shock			Ditto, t. xii. p. 426.
End of the month.	Olette in the eastern Pyrenees.	A slight shock			
Aug. 5.	Constantinople	A severe shock			Ditto, t. xxiii. p. 404.
12.	Island of Trinidad	Undulatory motion from E. to W., very severe, and lasting four or five seconds.		Preceded by a rushing noise, as of wind. It was a clear moonlight night, and nothing particu- lar was remarked in the state of the atmo- sphere. Two shocks were also felt at the same time in Grenada and St. Vincent.	Quart. Journ. Roy. Inst. vol. viii. p. 336; Ann. de Chim. et de Phys. t. xii. p. 426; Monteur, 24 Nov.
15.	St. Andrews in Lower Canada.			Attended by noise like the firing of cannon	Tilloch's Magazine, vol. liv. p. 316; Ann. de Chim. et de Phys. t. xii. p. 426.
18.	Voss in Sweden	Five shocks, of which the first was the most severe.		The noise was like that of a carriage passing rapidly over a stone bridge.	Rigshandelen for 1819, Nr. 20.
Between 9 ^h 15 ^m and 11 ^h 45 ^m A.M.					
29.	Salsdalen (Salsdalen?) in Norway.	A shock			Ann. de Chim. et de Phys. t. xii. p. 426; Bull. de la Soc. Géol. t. vii. p. 29.
30.	Ditto	Ditto			Ditto.
31.	Throughout a large dis- trict in Norway. Espe- cially at Salten and Heigeland in the pro- vince of Nordland. At Frosten and at Dron- theim shocks were also felt, but more feebly.	At Salsdalen the shock seemed to come from the S.W., and to extend across the Fiord. The shocks lasted six minutes, and were followed by other slight ones at 5 ^h and 7 ^h 5 ^m P.M. At Lunroe the di- rection seemed to be S. to N., and the shocks lasted four	At Hemnes the sea was as much agi- tated as in the most violent tempests, al- though the air was calm.	At Salsdalen there was a loud noise; the houses shook, and the windows rattled. The water of a little stream was rendered turbid. At Lunroe also streams were disturbed, and stones of considerable size were rolled down from the hills. At Hemnes chimneys were thrown down and water thrown up into the air. Noises accompanied by slight shocks were heard almost every day up to the 20th of October.	Rigshandelen for 1819, Nr. 83, 85, and 99.

1819. Aug. 31.	Vrola in Russian Lap-land.	until 7 the next morning. At Hem- noes the direction seemed to be E. to W., and at Statsbyg- den it was S. to N.	.....	.....	.....	Moniteur, 20 Nov.
— — —	Venice	A vibration sufficient- ly strong to throw down chairs and other furniture. A trembling.....	.....	.....	.....	Ann. de Chim. et de Phys. t. xii. p. 426.
— Sept. 4. 9 P.M.	Corfu	Two violent shocks, directed towards the north (S. to N.?).	.....	.....	All the bells of the town rang from the effect of the shock. The moon shone very brightly, and the air was quite serene. The Quart. Journ. Roy. Inst. gives the date Sept. 11.	Quart. Journ. Roy. Inst. vol. ix. p. 205.
— — — 28 and 29.	Lunrøe in Norway	Slight shocks .....	.....	.....	.....	Keilhau.
— — —	Irkutak	A violent shock .....	.....	.....	.....	Ann. de Chim. et de Phys. t. xxxiii. p. 404.
— Oct. Night between 2 and 3.	Saltdalen, Drontheim, &c. in Norway.	An earthquake .....	.....	.....	Preceded by a very loud noise, which appeared to pass from W. to E.	Ditto.
— — — 16. One hour after midnight (of the 15th?).	Island of Martinique. Also felt at St. Lucia.	The duration of the shocks was more re- markable than their intensity. More shocks .....	.....	.....	Occurred during a violent gale of wind	Ditto, t. xii. p. 426; Moniteur, 24 Nov.
— — —	Lunrøe in Norway .....	.....	.....	.....	.....	Memoir of M. Keilhau on Norwegian earthquakes.
— — — 19 and 20.	Island of St. Thomas's in the West Indies.	Three shocks .....	.....	.....	During the hurricane which blew on these days.	Quart. Journ. Roy. Inst. vol. viii. p. 356.
— — — 20.	Hemnoes in Norway	A slight shock .....	.....	.....	.....	Keilhau.
— — — 31.	Planen in Saxony	A very severe shock .....	.....	.....	.....	Ann. de Chim. et de Phys. t. xxxiii. p. 404.
— Nov. 10.	Lunrøe in Norway	A severe shock .....	.....	.....	.....	Keilhau.
— — — About the middle of the month.	Montreal in Canada	A slight shock .....	.....	.....	Followed by an awful storm, during which rain fell of an inky colour, apparently impregnated with a matter like soot.	Quart. Journ. Roy. Inst. vol. ix. p. 205; Ann. de Chim. et de Phys. t. xv. p. 421.
— — — 21.	Lunrøe in Norway	Another slight vibra- tion.	.....	.....	.....	Keilhau.

1.	2.	3.	4.	5.	6.
Nov. 28. Course in Perthshire, 10 th A.M. extending several miles round the village.		A severe shock from the N.W., lasted 10 seconds. More alarming than any felt here for ten years before.		Accompanied by the usual hollow grumbling sound. Furniture, plates, &c. were moved about and jingled.	D. Milne's Catalogue, <i>loc. cit.</i> ; Quart. Journ. Roy. Inst. vol. ix. p. 205; Ann. de Chim. et de Phys. t. xli. p. 426.
Dec. 3. Lunroe in Norway .. — 4. Amalfree in Scotland .. 0 th P.M.		Another slight shock. A smart shock, lasting two or three seconds. Direction, —by the Grampian Hills eastward.		Houses and furniture shook, and the whole went away with a noise like the slow passing of carts.	Keilhan. Quart. Journ. Roy. Inst. vol. ix. p. 205; Ann. de Chim. et de Phys. t. xv. p. 421.
— 17. Lunroe in Norway .. — 20. Mittenwald in Bavaria .. 5 th A.M.		Another slight shock. Shocks from S. to N., lasting seven or eight seconds. Several shocks			Keilhan. Ann. de Chim. et de Phys. t. xv. p. 421; Quart. Journ. Roy. Inst. vol. ix. p. 206. Ann. de Chim. et de Phys. t. xxxiii. p. 404.
— between .. — 25. .. Jan. 3. Lunroe in Norway .. — 10. Ditto .. — 12. Ditto .. — 17. Pistonia in Tuscany .. E.		A feeble shock .. Ditto .. A severe shock .. Undulatory, from W. to E., lasting four or five seconds. A rather severe shock ..			Keilhan. Ditto. Ditto. Ann. de Chim. et de Phys. t. xxxiii. p. 404.
— 19. Voss in Norway .. E.		A severe shock .. A strong earthquake, consisting of three distinct shocks, coming apparently from the N.		Accompanied by very loud noise. An eruption of Vesuvius began on the 16th.	Keilhan. Ditto. Quart. Journ. Roy. Inst. vol. ix. p. 206; Ann. de Chim. et de Phys. <i>loc. cit.</i>
— 20. Lunroe in Norway .. — 22. Port Glasgow; also felt at Couderic (Comrie?) .. P th A.M.		The waters of Loch Lomond were agitated and rose somewhat, so that some persons who were crossing it were alarmed by the sudden rippling of the water.		The rumbling noise as well as the motion seemed to come from the north. A rapid thaw had commenced that morning, succeeding a long and sharp frost.	Ditto. Quart. Journ. Roy. Inst. vol. ix. p. 206; Ann. de Chim. et de Phys. <i>loc. cit.</i>
— 27. Shooj in Cutch, Hindoos.				Attended by a loud noise like distant thunder.	Trans. Lit. Soc. of Bombay, vol. iii.

3 P.M. — — — to March 28.	Lunrøe in Norway Island of S ^{ta} Maura in the Archipelago.	short duration. A strong shock Altogether 424 shocks, apparently from various directions. Six of the shocks were much more violent than the rest, the worst of all occurring on the 17th of March.	..... ..... ..... Accompanied by subterranean noises. Vesuvius exhibited more than usual agitation during the whole of this period.	p. 422. Keilhau. Brugnatelli, Giornale di Fisica, 1820, p. 144.
— and February. — Feb. 8. — — 21.	Moor in Hungary Lunrøe in Norway S ^{ta} Maura	Numerous shocks A slight shock..... A shock, said in the Ann. de Chim. et de Phys. to be the most violent of those felt about this time in S ^{ta} Maura.	..... ..... ..... Great damage done..... A dull noise was heard from the morning, followed by a violent storm, and afterwards the shock. Numbers of the buildings fell, and the square in the centre of the town sank. A new island was said to have appeared in the neighbourhood.	Langlois, Dict. de Géogr. art. Moor. Keilhau. Ann. de Chim. et de Phys. t. xv. p. 422.
— — 23. 11 ^h 30 ^m P.M. — Mar. 3. At night.	Chiatimone Unalaska, one of the Aleutian Isles.	A shock A great shock .....	..... ..... ..... During a violent eruption of Vesuvius Accompanied by a very intense subterranean noise. A new volcano appeared in the island of Turinak, 100 wersts from Unalaska.	Ditto, t. xxxviii. p. 142. Garnier, Météor. p. 127.
— — 17. 9 A.M.	S ^{ta} Maura	According to the Giornale di Fisica, the worst of the shocks of this period.	..... ..... ..... In the midst of a great tempest. Much damage done.	Brugnatelli, Giornale di Fisica, 1820, p. 144. Ann. de Chim. et de Phys. t. xv. p. 422. Keilhau.
— — April 2. — 6. Between 2 and 3 A.M. — 11. Between 2 and 3 A.M.	Island of Chios Lunrøe in Norway Cork, Ireland, and the neighbouring towns. Cove, Aghada, Middleton, and the neighbourhood of the mouth of Cork harbour.	One shock A strong shock Shocks..... The motion lasted about eight or ten seconds at Cove.	..... ..... ..... Accompanied by a noise like the rolling of a heavy carriage over pavement. Accompanied at Cove by a rumbling noise. At Aghada the noise was like the firing of cannon. This is doubtless the same event with that reported as having happened on the 6th; but which is the correct date?	Ann. de Chim. et de Phys. t. xv. p. 422. Keilhau. Ann. de Chim. et de Phys. t. xv. p. 422. Quart. Journ. Roy. Inst. vol. ix. p. 425.

2.	3.	4.	5.	6.
Apr. 17. Larrée in Norway	A severe shock			
— 21. Brest	Very sensible motion,			
5 P.M.	apparently from E. to W.		Accompanied by dull explosive noises, lasting Ann. de Chim. et de Phys. t. xv. p. 422.	
— 22. Island of Cuba	A severe earthquake			
May 4. Acapulco	Commencement of very violent shocks, which continued almost without interruption until the 10th.			Ditto, t. xxxiii. p. 404.
— 7. Irkutsk	A shock of such violence that the houses could be perceived to lean towards the north (!).			Dupetit-Thouars, Voyage de la Vésuve, t. ii. p. 213.
— 10. Acapulco				Moniteur, 3 Août.
		The sea retired from half the bay, leaving the rocks dry. The motion was that of alternate flux and reflux, with an interval of rest at the highest and lowest levels. After two hours the sea returned, and rose to a church on the highest side of the town. When the water retired for the second time the mole was left almost entirely covered with sand, and a greater surface of the bay was exposed. The sea then gradually		Dupetit-Thouars, loc. cit.

	fries.	An earthquake	Accompanied by volcanic eruption	Earthquakes.
June 11. 11 ^h 30 ^m (A.M. or P.M.?).	Gunong-Api in the island of Banda.	An earthquake	.....	Garnier, Météor. p. 127.
— 17.	Lunrøe in Norway	A feeble shock	.....	Keilhau.
— 17.	Innspruck	A rather severe shock	Probably only the same with that of July 17	Ann. de Chim. et de Phys. t. xxxiii. p. 404.
July 5. 3 ^h 25 ^m A.M.	Tiflis in Georgia	Two shocks	Accompanied by very violent detonation	Moniteur, 17 Sept.; Ann. de Chim. et de Phys. t. xv. p. 422.
— 17. 7 ^h 30 ^m A.M.	Innspruck. Also felt at Swatz and the mountain of St. George's.	A strong trembling, lasting four seconds.	Accompanied by a loud cracking noise. Occurred during the celebration of a service in honour of St. Alexis, held in pursuance of a vow made in 1670 on the occasion of a similar phenomenon.	Moniteur, 30 Juillet, 1 et 3 Août; Journ. des Débats, 29 Juillet; Quart. Journ. Roy. Inst. vol. x. p. 199.
Aug. 10. — 18. — 20.	Lunrøe in Norway	Four slight shocks	.....	Keilhau.
— 21. About 2 P.M.	Ditto	Two ditto	.....	Ditto.
— 22. — 29.	Ditto	One ditto	.....	Ditto.
— 29.	Island of Curaçoa. Not felt in the Antilles.	A severe shock	.....	Ann. de Chim. et de Phys. t. xv. p. 422.
— 22. — 29.	Lunrøe in Norway	Another slight shock.	.....	Keilhau.
— 22. — 29.	Ditto	Ditto	.....	Ditto.
— 29.	At sea, between Sicily and the Morea, in lat. 36° 12'.	.....	.....	Férussac, Bull. des Sc. Nat. t. xvii. p. 43.
Sept. 14. — 27. 9 P.M.	Lunrøe in Norway	Another slight shock	.....	Keilhau.
— 27. Oct. 10. — 19.	Barmouth in Merioneth-shire.	A shock	Accompanied by noise like that of cannon	Ann. de Chim. et de Phys. t. xv. p. 423.
— 19. — 23.	Lunrøe in Norway	Another slight shock	.....	Keilhau.
— 23. — 28.	Honduras, Omba, and St. Pardo.	.....	In St. Pardo the church and many houses were thrown down. The earth opened in many places, some little hills fell into the river, and many people perished.	Ann. de Chim. et de Phys. t. xv. p. 422; Moniteur, 23 Nov.
— 23. — 24.	Berne	A slight trembling	.....	M. Studer's Catalogue.
— 24. — 28.	Kamtschatka	Several shocks from N. to S. Very violent, lasting altogether three minutes.	.....	Mém. de l'Acad. Imp. de St. Pétersbourg, t. x. p. 40.

1.	2.	3.	4.	5.	6.
1820, Nov. 13 At night.	Marseilles	Several people believed that they felt a slight earthquake shock.			Ann. de Chim. et de Phys. loc. cit.
8 ^h 15 ^m P.M.	Island of Antigua	A shock of rather long duration.			Ditto.
7 ^h 40 ^m A.M.	Ditto	Another shock			Ditto.
8 A.M.	Leadhills and Warlockhead in Scotland. Felt 10 miles to E. and 3 or 4 to W.			Felt in the mines. A bed was shaken by the motion, which was attended with a hollow rumbling noise. The atmosphere was perfectly still before the shock.	The Tilloch's Magazine, vol. lvi. p. 463; B. Milne's Catalogue of British Earthquakes.
11 ^h or 11 ^h 30 ^m P.M.	Ditto	Another shock			Ditto.
10 ^h 30 ^m (A.M.?).	Ditto	Ditto			Ditto.
Dec. 12 4 A.M.	In the neighbourhood of Innspruck.	A rather severe shock of some seconds duration.			Moniteur, 26 et 27 Déc.
About the middle of the month.	In Upper Bavaria, and the northern part of the Tyrol.	A rather severe shock		Probably the same with the last account	Ann. de Chim. et de Phys. t. xv. p. 423.
22	In the Peloponnese	Trembling			Springs of boiling water came out of the earth in Elis, and rocks fell suddenly in Arcadia.
25.	Kintail, Loch Earne, &c. in Scotland.				Tulloch's Magazine, vol. lvi. p. 147.
At night.	In the Morea and Ionian Isles, especially in Zante; including a circuit of about 250 leagues.	There seemed to be three shocks, of which the first was vertical, the second horizontal, and the		The weather had been stormy for some days before. At 4 ^h 10 ^m A.M. there was an extraordinary gust of wind, which suddenly ceased, it became calm, and soon after the earthquake	Journ. de Phys. t. xcii. p. 466; Ann. de Chim. et de Phys. t. xvii. p. 413; Moniteur, 15 Fév. 1821; Gilbert's Appeal, B. lvi. p. 889.

1820. Dec. 29.	Island of Celebes	oscillations followed. A severe shock	The sea rose several times to an unusual height, and carried away many houses.	five days after the earthquake. Three or four minutes before the first shock a very large igneous meteor (apparently 4 to 6 feet in diameter) was observed over the sea off Point Gerakas, and remained visible for five or six minutes. On the 30th a luminous meteor described a vast parabola over the town, and fell into the sea. Numbers of houses were thrown down or injured in Zante, but only four men were killed. Many hundred people lost their lives	Leonhard's Taschenb. für Mineralog. Jahrg. 18. S. 724; Quart. Journ. Roy. Inst. vol. xii. p. 427.
—	Coquimbo			The town was nearly destroyed, but the shock was local, and produced no alarm in other parts of the country. Terrible storms	Quart. Journ. Roy. Inst. vol. xvii. p. 39. Moniteur, 9, 10, 11, 12, et 13 Fév.
1821. Jan. Beginning of the month.	In Portugal	Earthquake shocks, said by some to have been felt at this time, others however denying the fact. More shocks			
—	Island of Celebes, especially at Boeloe Comba.				Revue Encycl. 1822, Juin; Archiv. des Découv. 1822, p. 193; Quart. Journ. Roy. Inst. vol. xii. p. 427.
6 ^h 45 ^m P.M.	6. Zante and in the Morea	Several shocks. Much slighter than the former ones; lasted about 80 seconds, apparently in the same direction as before. A strong shock	On the 9th January the water of the Aegyonic Sea, a part of the Gulf of Corinth, rose suddenly, inundating the country, and carrying away houses.	Much damage done in the villages. The town of Sala in the Morea was almost entirely destroyed by these shocks and those of December, numbers of people perishing beneath the ruins. The Archives des Découvertes (1822, p. 189) gives the date January 14.	Ann. de Chim. et de Phys. t. xviii. p. 413; Moniteur, 9 Avril; Journ. de Phys. t. xcii. p. 466; Soutzo, Hist. de la Rév. Grecque, p. 52.
15. Berne	15. Berne				Ann. de Chim. et de Phys. t. xviii. p. 414; M. Studer's Catalogue.
2 ^h 30 ^m A.M.	29. Kieff in Russia	Rather severe shocks from E. to W.			Ann. de Chim. et de Phys. t. xviii. p. 414; Archiv. des Découv. 1822, p. 189.
2 A.M.					

1.	2.	3.	4.	5.	6.
1821. Feb. 4. Bergen in Norway About 1 ^h 30 ^m A.M.		Rather severe shock, followed by another of a minute's dura- tion at half an hour after noon, and at 8 P.M. by two others with an interval of three or six minutes. The first of which was the most con- siderable, but was nevertheless lighter than that at 12 ^h . Apparent direction N. to S.			Rigstidenden, 1821, Nos. 15 and 30; Ann. de Chim. et de Phys. <i>loc. cit.</i> ; Archiv. des Découv. 1822, p. 190.
— 8 P.M.	Voss in Norway	Two shocks, of which the first was the stronger.			Ditto.
— 6 ^h 30 ^m P.M.	Ditto	A feeble shock			Keilhan.
— 10. Jassy in Moldavia		A perceptible earth- quake.		The Mém. de Chronol. (t. ii. p. 935) gives the date February 3-4 for this event, which is said to have been very remarkable, and to have been followed by other shocks in Moldavia in July, August, and September. Probably only the same event with that reported on the 29th of January.	Ann. de Chim. et de Phys. <i>loc. cit.</i> ; Journ. des Débats, 1 Avril.
— 2 A.M.					
— Kieff in Russia. Also felt at Dubossar.		A shock lasting fifteen seconds at Kieff. Direction E. to W.			Ditto.
— 22. Voss in Norway		A very severe shock.			Keilhan.
— 3 ^h 30 ^m P.M.		The shocks observed at this place appeared to pass from W. to E.			
— End of the month.	Quebec in Canada	A slight shock.....			Ann. de Chim. et de Phys. <i>loc. cit.</i> ; Archiv. des Découv. 1822, p. 190.
— In Kamtschatka		Many severe and long-		Preceding a violent eruption of the volcano St. Petersb. Zeitschrift, 1825, März,	

1821. Mar. 5. 5 A.M.	Island of Martinique	Several shocks	.....	The Archives des Découv. gives the hour 3 A.M.	Ann. de Chim. et de Phys. <i>loc. cit.</i> ; Archiv. des Découv. 1822, p. 190.
— 9.	Island of Bourbon	A shock of but short duration.	.....	During a violent eruption of the volcano on this island, which began on the 27th of February. The Archives des Découv. gives the date of the shock March 19.	Ann. de Chim. et de Phys. t. xxxiii. p. 404.
— 22.	Rieti in the States of the Church.	An extremely severe shock.	.....	At the moment of the shock a column of fire was seen to rise from the Fiume-di-Canera, which passed over the town, and seemed to fall into the lake of Cantelice.	Ann. de Chim. et de Phys. <i>loc. cit.</i> ; Journ. des Débats, 21 Avril.
— April 8. 2 ^h 30 ^m P.M.	Melilla in the kingdom of Fez.	A severe shock, followed by other slighter ones.	.....	Accompanied by noise of extraordinary intensity	Ann. de Chim. et de Phys. <i>loc. cit.</i>
— May 9.	Lunrøe in Norway	A feeble shock	.....	.....	Keilhau.
— June 8. 5 A.M.	Island of Martinique	An earthquake	.....	Following a sudden gale of wind, one of those there called "Grains."	Ann. de Chim. et de Phys. t. xviii. p. 414; Arch. des Découv. 1822, p. 190.
— 25. Between 7 and 8 P.M.	In the county of Cork, Ireland.	"Subterranean motion." The shocks were numerous and violent.	.....	Fields were converted into marshes or quasgires	Journ. des Débats, 26 et 29 Juillet.
— July 25. 3 ^h 30 ^m A.M.	Lunrøe in Norway	Another slight shock	.....	.....	Keilhau.
— Aug. 2.	Naples	A slight shock. Apparently in the direction of the meridian.	.....	.....	Ann. de Chim. et de Phys. t. xviii. p. 414; Tenore, Géogr. Phys. et Botan. du Royaume de Naples, p. 93.
— 3.	Argelès and Lourdes in the departm. Hautes-Pyrénées.	A slight shock.	.....	.....	Ann. de Chim et de Phys. t. xviii. p. 414; Archiv. des Découv. 1822, p. 190.
— 20. of 26.	St. Thomas and St. Croix in the West Indies.	Several shocks. Others were felt for some days before.	.....	About the 20th a fire-ball was seen, the crackling of which could be heard. It vanished without explosion.	Leonhard's Taschenb. für Mineralogie, Jahrg. 18. Abtheilung 3. S. 725; Gilbert's Annalen, B. lxi. S. 223.
— Sept. 1.	Catanzaro in Calabria	Frequent shocks	.....	.....	Ann. de Chim. et de Phys. t. xxxiii. p. 405.
— 15.	Lunrøe in Norway	A slight shock.	.....	.....	Keilhau.
— 12.	Ditto	Ditto	.....	.....	Ditto.
— 17.	Jassy in Moldavia	Another shock	.....	Did much damage to buildings	Ann. de Chim. et de Phys. <i>loc. cit.</i>
— 20.	Könitz near Berne	A trembling	.....	.....	M. Studer's Catalogue.

1.	2.	3.	4.	5.	6.
1821. Sept. 23. 3 P.M.	Albano and Frascati in Italy.	One shock .....	.....	.....	Ann. de Chim. et de Phys. <i>loc. cit.</i>
— Oct. 6 & several preceding days.	District of Giastro in Calabria.	Continuous shocks, of which some were very violent.	.....	The town of Catanzaro especially suffered	Gilbert's Annalen, B. lxi. S. 223.
— 7.	Epinal, Remiremont, and Plombière, in the department. Vosges.	Several shocks from S. to N., lasting thirty seconds.	.....	“Bruit semblable à celui que font entendre, quand elles tournent avec rapidité ces sphères creuses et percées d'un trou que les enfants appellent des <i>Diablos</i> .”	Ann. de Chim. et de Phys. t. xxi. p. 393.
— 8.	District of Orihuela, kingdom of Murcia, Spain.	Commencement of shocks, which lasted twenty-six days.	.....	.....	Ann. de Chim. et de Phys. t. xlv. p. 396; Férussac, Bull. des Sc. Math. Janv. 1831, p. 36.
— 9 or 10.	Strathearn, a few miles east of Crieff, Scotland.	.....	.....	The noise resembled that of a mail-coach on a bad road. A person felt the ground move under his feet, as if it had been a piece of moving bog.	D. Milne's Catalogue of British Earthquakes.
— 11 to 14.	Sienna in Tuscany	Eight or ten shocks daily for this time. Direction = W. to E.	.....	The shocks were constantly felt about midnight and at sunrise.	Gilbert's Annalen, <i>loc. cit.</i> ; Ann. de Chim. et de Phys. t. xxxiii. p. 405.
— 15.	Island of Bute, Rothsay.	Slight undulatory motion, lasting a few seconds.	.....	.....	Tilloch's Magazine, vol. lviii. p. 458.
Early in the morning.	and Greenock, Scotland.	.....	.....	.....	Ann. de Chim. et de Phys. <i>loc. cit.</i>
— 17.	Sienna in Tuscany	Several shocks, the most severe of which occurred at 8 A.M.	.....	.....	.....
— 18.	Ditto	Five shocks .....	.....	.....	Ditto; Gilbert's Annalen, <i>loc. cit.</i>
At night.	.....	.....	.....	.....	.....
— 22.	Comrie, Crieff, Loch Erne, Inverary, and at Down, thirteen miles down Loch Fyne, Scotland.	A vibratory shock .....	.....	Accompanied by noise like that of several carriages in motion. Thunder and lightning at same time.	D. Milne's Catalogue; Ann. de Chim. et de Phys. t. xxi. p. 393; Edinburgh Philos. Journ. vol. vi. p. 191.
— 24.	Sienna in Tuscany	The last of the shocks felt about this time.	.....	Followed on the 25th by a thunderstorm	Ann. de Chim. et de Phys. t. xxxiii. p. 405; Gilbert's Annalen, <i>loc. cit.</i>
In the morning.	.....	.....	.....	.....	.....
— 28.	In Upper Saxony, extending as far as Krotendorf (between Scheibenberg and Schwartz-	One or two undulatory shocks, lasting 15 seconds, or according to some, 2 mi-	.....	A noise was heard like that of three or four carriages rolling after each other, and some people spoke of luminous phenomena seen at the same time. A thick fog prevailed on this day,	Ann. de Chim. et de Phys. t. xviii. p. 414; Gilbert's Annalen, B. lxi. S. 220, 325, 435.
Between 9 ^h 30 ^m and 9 ^h 45 ^m P.M.	.....	.....	.....	.....	.....

enberg) on the S., Eitritsch near Leipzig on the N., Mitweida on the E., and Etzdorf near Eisenberg on the W. The principal axis of disturbance seems to have run S.E. and N.W., at right angles to the chain of the Erzgebirge.	notes.		as well as on those preceding and succeeding. The shock was especially strong on the line between Penig and Weichselburg; and at some places in the area mentioned, as at Zwickau, Chemnitz, and Borna, was not felt at all.
1821. Oct. 29. Glasgow, Greenock, &c. In the evening.	A vibration		On the same day an unusually thick fog prevailed in London.
1 P.M.			
30. Annaberg and Schwarzenberg in the Erzgebirge, Saxony.	Vibratory motion, lasting three to five minutes, in the direction E. to W.		Ditto, S. 329.
Nov. 17. Lemberg in Galicia ...	Slight shocks, lasting some seconds.		Ditto, S. 329 u. 435; Férussac, Bull. des Sc. Nat. t. xvii. p. 343.
2 ^h 50 ^m P.M.	Three strong shocks...		Ditto.
3 ^h 45 ^m P.M. and in some places as late as 4 P.M.	Kieff in Podolia, the other southern governments of the Russian Empire, Jassy in Moldavia, and as far as Tiflis in Georgia.		At Jassy some damage was done to buildings; in Kieff the shocks were but alight, but were stronger at Olgopol, Uman, Dubossar (in the government of Cherson), Machnowka, Nikolajew, and Otschakow.
22. In the provinces of Capitanata and Molise, kingdom of Naples, particularly at Tremoli and Porto-Cannone. Felt but feebly at Naples.	A strong shock from E. to W., followed, rather slowly, by seven others.		A luminous meteor moving in the same direction as that taken by the shock was observed just before. At Tremiti and elsewhere some damage was done to buildings, &c. The autumn had been dry, and since the middle of October, cold. On the 5th November there was a violent storm.
27. Leadhills and Wanlockhead, Scotland.	A slight shock, followed, at 11 P.M., by another shock, unaccompanied by trembling motion.		Accompanied by a hollow rumbling noise, heard distinctly by the miners at a depth of 150 fathoms. The noise was still louder on the occurrence of the second shock.
8 A.M.			D. Milne's Catalogue.
29. Odessa	Vibratory. Lasting about forty seconds.		Probably only the same event with that of the 17th, the difference of style accounting for the different dates.
			Gilbert's Annalen, loc. cit. S. 329; Ann. de Chim. et de Phys. t. xxxiii. p. 405.

2.	3.	4.	5.	6.
<p>20. Prague M. or</p> <p>— 20. In Iceland The earth trembled strongly.</p>	<p>Several considerable shocks.</p> <p>The earth trembled strongly.</p>			<p>Gilbert's <i>Annales</i>, loc. cit. S. 436.</p> <p>Ann. de Chim. et de Phys. t. xxxi. p. 397; Journ. des Débats, 8 et 9 Avril, 1822; Edinb. Philos. Journ. vol. vii. p. 153, &c.</p>
<p>— 24. Rhinthal (Rheinthal ?), Switzerland.</p> <p>— 25. Mayence P.M.</p>	<p>A shock ...</p> <p>A slight shock.....</p> <p>Two strong shocks ...</p>		<p>During the violent eruption of the volcano Eyndfeld-Jökull, which began on the 19th, continued with great violence for many days, and had not ceased on the 28th of February, 1822. On the 25th of December there was a violent storm from the south, and on the 26th and 27th from the north-east; accompanied by an unusually low state of the barometer, ob- served over a great part of Europe. Preceded by the appearance of several luminous meteors.</p> <p>On the same day a violent tempest raged at Genoa, in Upper Italy, and in Switzerland. A remarkable fall of the barometer was also ob- served over almost the whole of Europe.</p>	<p>Ann. de Chim. et de Phys. t. xxxiii. p. 405.</p> <p>Ditko, t. xxi. p. 393; Edinb. Philos. Journ. vol. vii. p. 155.</p> <p>Ann. de Chim. et de Phys. t. xxviii. p. 405.</p>
<p>— 26. On the coast of the Adri- atic (east or west coast ?). Bima in the island of Sumbawa, principally under the sea.</p>	<p>At Bima the shocks occurred at regular intervals of five or six minutes.</p>	<p>The earthquake under the sea off Bima was tremendous, ships being carried by the "sea-wave" inland, even over houses. The com- motion extended to the coasts of Ce- lebes and Macassar.</p>	<p>At the same time with the shocks a submarine volcano near Bima threw out burning stones, ashes, and thick smoke.</p>	<p>Reinwardt in Magaz. voor Wetensch. Konst en Lett. p. v. H. l. p. 71.</p>
<p>m. 9. At Naples 8 P.M.</p> <p>— 19. Salerno in Italy</p>	<p>A slight vibratory shock from E. to W.</p> <p>Two slight shocks, one in the day, and one at night.</p>		<p>On the 13th of February an eruption of Vesuvius began, which ceased on the 25th; though ashes continued to be thrown forth almost the whole summer through, and the eruption re-</p>	<p>Tenore, loc. cit. p. 94.</p> <p>Ann. de Chim. et de Phys. t. xxxiii. p. 403, t. xxi. p. 398.</p>

1822. Jan. 26. Komarom in Hungary.....	.....	.....	.....	.....	Férussac, Bull. des Sc. Nat. t. xviii. p. 195, quoting from Michael Holeczy, Tudományos Gyűjtemény, 1824, Nr. v. p. 56-61.
— Feb. 6. Ditto .....	.....	.....	.....	.....	Ditto.
— 8. Landshut in Bavaria ...	.....	.....	.....	.....	Ann. de Chim. et de Phys. t. xxi. p. 393.
— 15. Halland in Sweden.....	.....	.....	.....	.....	Ditto, t. xxxiii. p. 405.
— 18. Komorn in Hungary ...	.....	.....	.....	.....	Ditto.
— 19. In France and Switzerland. Felt at Belley, Dijon, Clermont, Lyons, Bourg. Geneva, Lausanne, Berne, Zurich, Chambery, Anancy, Albi, and at Aix.	.....	.....	.....	.....	Journ. des Débats, 25 Fév. et 7 Mars; Ann. de Chim. et de Phys. t. xix. p. 106 et 185, t. xxi. p. 393; M. Studer's Catalogue.
8 ^h 15 ^m A.M. At Lausanne at 9 ^h 15 ^m . At Berne 9 ^h.	.....	.....	.....	.....
— 22. Komarom in Hungary.....	.....	.....	.....	.....	Férussac, <i>loc. cit.</i>
— 23. Ditto .....	.....	.....	.....	.....	Ditto.
— 3 ^h 35 ^m P.M. At Chambery at 3 ^h 43 ^m.	.....	.....	.....	.....	Journ. des Débats, 5 Mars; Ann. de Chim. et de Phys. t. xxi. p. 393; M. Perrey's Memoir on Earthquakes in France, Belgium, and Holland.
— 24. Komarom in Hungary.....	.....	.....	.....	.....	Férussac, <i>loc. cit.</i>
— 26. Ditto .....	.....	.....	.....	.....	Ditto.

	2.	3.	4.	5.	6.
Feb. 27. Komarom in Hungary.....					Férussac, <i>loc. cit.</i>
— 28. Ditto					Ditto.
— March 1. Ditto					Ditto.
— 3. Ditto					Ditto.
— Basano in Italy		A slight shock			Ann. de Chim. et de Phys. t. xxxiii. p. 405.
— P.M. Several villages near				Attended with a rumbling noise	Gentleman's Magazine, vol. xcii. pt. i. p. 365.
— 20. York					L. Stulli, Sulle Detonazioni dell'isola di Meleda, Ragusa, 1823;
— "Island of Meleda, not		Commencement of the On the 22nd a sub-			Paul Partsch, Bericht über das
— "far from Ragusa.		marine eruption was			Detonations Phenomenen auf der
— "place, but which do		supposed to have			Isol Meleda bei Ragusa, Wien,
— "not seem to have		occurred near Mar-			1826.
— "been accompanied by		sala in Sicily. Journ-			
— "any true earthquake		des Débats, 23 Avril			
— "shocks, or, at least,					
— "any such felt were					
— "extremely slight					
— "Several shocks					
April 5. Country around Etna				Accompanying the commencement of an erup-	Ferrara, Edinburgh Journal of Sci-
— 6. Ditto; especially the				tion. Subterranean explosions were heard.	ence, Nrs. 7 and 8.
— "towns of Nicosia, Ca-				The eruption did not cease until October.	Ditto; Ann. de Chim. et de Phys.
— "pizzi, Ceasaro, Sper-					t. xxxiii. p. 405.
— "linga, Troina, Gaugli-					
— "and Gagliaro. The					
— "centre seemed to be					
— "Nicosia.					
— 8. Komarom in Hungary.					Férussac, <i>loc. cit.</i>
— 10. Nicosia and the towns		Another shock, more		A violent clap of thunder was heard while the	Ferrara, &c. as quoted above.
— "near Etna.		violent than those		sky was quite clear.	
— 13. Comrie in Perthshire		of the 6th.			
— 9. 30. The most violent		shock felt for twenty		Accompanied by two loud reports, the one over	Milne's Catalogue; Ann. de Chim.
— 18. Catania in Sicily		years.		head, and the other, immediately after, appa-	et de Phys. t. xxxiii. p. 406.
— 19. Ditto		Slight shock		rently under foot. The noise lasted thirty	
— "seconds, and was louder than any thunder.					Ann. de Chim. et de Phys. <i>loc. cit.</i>
— 19. Ditto					Ditto.

[illegible]

2.	3.	4.	5.	6.
the 29. Komarom in Hungary.....				Férussac, <i>loc. cit.</i>
uly 1. Ditto				Ditto.
6. Lisbon.....	A violent shock, last- ing 6 or 7 seconds. The oscillation was rather vertical than horizontal.		The Archives des Découvertes gives the date Ann. de Chim. et de Phys. t. xxi. p. 393. July 10.	
10. Ancona			Accompanied by loud explosive noise. On the 11th at dawn an eruption of Vesuvius began.	Ditto, t. xxiii. p. 405.
14. Catanzaro in Calabria... A rather severe shock.				
15. Komarom in Hungary.....				Ditto.
22. Ditto			On the 23rd, at 6 A.M., a violent eruption of the volcano Gunung-Ber-Api in Sumatra.	Férussac, <i>loc. cit.</i>
25. Ditto				Ditto.
28. In several quarters in A slight vibration				Journ. des Débats, 9 Août; Ann. de Chim. et de Phys. t. xxi. p. 393.
night. Madrid.....				
29. Granada in Spain	A violent earthquake; the shocks were re- newed on the fol- lowing night.		Many buildings were injured, among others the tower of the cathedral.	Archiv. des Découv. 1823, p. 187.
30. Catanzaro in Calabria.....	A slight shock			Ann. de Chim. et de Phys. t. xxiii. p. 405.
ag. 1. Island of Martinique ...	Ditto. None had been felt for two years before.			Ditto, t. xxi. p. 393; Archiv. des Découv. 1823, p. 188
8. Laybach in Carinthia...	A rather severe shock.....			Ann. de Chim. et de Phys. t. xxiii. p. 406.
m A.M. Tomak in Siberia	A violent shock from N. to S., lasting one minute.			Ditto, t. xxi. p. 393; Journ. des Débats et Monteur, 11, 12 et 13 Nov.
m P.M. Komarom in Hungary.....				Férussac, <i>loc. cit.</i>
10. Aleppo	Beginning of the shocks.			Ann. de Chim. et de Phys. t. xxi. p. 393, et t. xxx. p. 433; Moni- teur, 5 Oct., 13 Nov., 1 Janv.; Journ. des Débats, 2, 4 Oct., 25 Nov. et 31 Déc.; Vernier, Journ. de Phys. t. xxi. p. 393, 6 et 8.

1822. Aug. 12. Komarom in Hungary .. — 13. Aleppo. Also felt at 8 P.M. Beyrout and Alexan- dria.	..... Between Alexandria and Cyprus, in long. 28° 35' E. (from Paris), and lat. 34° 28' N., a rock ap- pears to have risen from the sea.	..... Accompanied by subterranean noise, which in- creased up to 8½ P.M. A large part (two- thirds) of the town was destroyed, and several thousand of the inhabitants perished beneath the ruins. Antioch, Latakiah, Djezar, and other towns within a radius of 50 leagues, were also much injured. The weather had been very hot and close at Aleppo.	Férussac, <i>loc. cit.</i> Ann. de Chim. et de Phys. &c., as just quoted.
— 21. Komarom in Hungary .. — 22. Ditto .. — 25. Ditto .. — 28. Venice .. 10 ^h 40 ^m A.M. — 29. Ditto .. 3 ^h 45 ^m (Italian time?) — 30. Agram in Croatia .. 1 P.M.	..... ..... ..... Slight shocks Ditto Vibratory shock, last- ing five seconds.	..... ..... ..... During serene weather The shock was more perceptible in the moun- tains which surround the town from W. to N. Accompanied by subterranean noise like thunder.	Férussac, <i>loc. cit.</i> Ditto. Ditto. Ann. de Chim. et de Phys. t. xxxiii. p. 405; Journ. des Débats, 17 Sept. Ditto.
— Sept. 4. Port of Spain, island of .. 8 ^h 55 ^m A.M. Trinidad. — 5. Aleppo ..	..... ..... More shocks ..	..... ..... Destroyed what had resisted the former earth- quake. More than 20,000 persons are said to have lost their lives by these shocks, which were felt in several other towns, at Damascus, and in the island of Cyprus.	Moniteur, 23 Oct. Authorities quoted under Aug. 10.
— 10. Karlstadt in Wermeland, A .. — 11 ^h 30 ^m P.M. Sweden. Felt as far as the extremities of the province.	..... A strong earthquake shock, from E. to W.	..... ..... P preceded by a noise like that of a cannon, and accompanied by the appearance of a number of very brilliant shooting stars. Aërolites said to have been found in various places.	Ann. de Chim. et de Phys. t. xxi. p. 393; Moniteur et Journ. des Débats, 11 Oct.; Keferstein.
— 13. Komarom in Hungary .. — 18. Dunston near New- castle-on-Tyne.	..... A severe shock ..	..... Accompanied by a loud noise like distant thun- der.	Férussac, <i>loc. cit.</i> Quart. Journ. Roy. Inst. vol. xiv. p. 450; Ann. de Chim. et de Phys. t. xxi. p. 393; Journ. des Débats, 12 Nov.; Moniteur, 13 Nov.
Between and 2 A.M.			

	2.	3.	4.	5.	6.
Sept. 29. A.M.	Cádiz. Also felt at Algeiras and Cordova.	A strong shock from E. to W., lasting nearly 2 seconds. Several more shocks.			Ann. de Chim. et de Phys. loc. cit.; Journ. des Débats, 16 Oct.
—	Aleppo				Ann. de Chim. et de Phys. t. xxiii. p. 406; Journ. des Débats, 16 Déc.; Moniteur, 17 Déc.
— 30. Ditto		Ditto			Ditto.
—	Between the volcanoes Gunung-Ber-Api and Gunung-Tallang, in the province of Menangkabon, island of Sumatra.	The shocks were felt hourly during 24 hours.		Accompanied by subterranean noise, which sometimes seemed to come from the one volcano, and sometimes from the other. Tallang gave forth smoke, but no eruption had been known to occur for a long time.	Asiatic Journal, 1826, May, p. 577.
Oct. 1. Mica in Bohemia and neighbourhood.	A very distinct shock.			On the 8th there was a most violent eruption of the volcano of Galong (or Galung Gunung) in the island of Java.	Fröberg's Notizen, &c. B. iii. No. 58.
— 8. In Murcia, Spain	Several shocks.			Some motion of the earth gave notice of an eruption which began on the 22nd, at 2 p.m.	V. Hoff.
— 18. Country around Vesuvius; at Naples.				The shower of ashes ceased on the 25th, and the last appearance of smoke was seen on the 4th November. Stromboli and Vulcano also showed unusual signs of activity.	Wiener Zeitung, 1823, Mai, S. 529; Geist der Zeit. Jul. 1823, S. 123; Péroussac, Bull. des Sc. Nat. t. I. 1824, p. 115; Moniteur, 10 Nov.; Journ. des Débats, 12 Nov.
Nov. 1. Norrdelge and all the northern coast of the Baltic.	A slight shock			Accompanied by rolling noise	Kefenstein, p. 342; Kallban.
— 4. Copiapo in Chili	A severe shock			Many houses injured	Quart. Journ. Roy. Inst. vol. xvii. p. 39.
— 5. Ditto, and at Coquimbo.	A much more violent earthquake.			Copiapo was nearly destroyed, and Coquimbo also suffered considerable injury.	Ditto.
— Komarov in Hungary					Péroussac, Bull. des Sc. Nat. t. xviii. p. 195.
— Aleppo	Severe shocks felt almost daily. On the night of the 12th a very violent				Ann. de Chim. et de Phys. t. xxi. p. 393; Moniteur, 16 Fév. 1823.

1822. Nov. 19. 10^h 15^m P.M., or a little after.

In Chili. Felt as far south as Concepcion, and eastward of the Andes at Mendoza and St. Juan. The centre of disturbance was probably about 15 miles N.E. of Valparaiso.

Very violent shocks, lasting 3 minutes. A few minutes later the earthquake recommenced, and from this time shocks were felt almost the whole night, two or three every five minutes, each lasting half a minute or a minute. The first three shocks were by far the most severe. During the violent shocks it seemed as if the earth were raised up and moved from N. to S., and then sank again, but occasionally a movement at right angles to this was also felt. At Santiago and Valdivia the earthquake was less severe. To the N. of Valparaiso the shocks seemed to come from the S.W., while S. of that place they appeared to be from the N.W. Shocks were felt occasionally up to the end of Sept. 1823.

The effect seemed to people on board the ships in the harbour of Valparaiso, as if they were rapidly forced through the water and then struck the ground. The sea here rose to an amazing height, and then retreated so far that all the small boats were left dry upon the strand. It continued rising and falling, though to a gradually diminished extent, for a quarter of an hour. The earthquake was also felt on board ships lying at Callao.

The atmosphere was perfectly clear and fine, and the moon shone brightly. The shocks were accompanied by noise like the bursting forth of vapour. The greater part of the towns of Valparaiso, Melipilla, Quillotoa and Casabianca was ruined. In the morning the streams and lakes were found greatly swollen by the snow which had fallen from the mountains. The water of the lake Quintero, which is connected with the sea, was much lowered. In the valley of Viña a la Mar the earth was covered with heaps of sand 3 or 4 feet high, which had been thrown up mixed with water from holes beneath. Cracks opened in the granite of the promontory of Quintero *parallel to each other and to formerly existing and similar ones*. Some examples of apparent vorticose motion were recorded. In the mine of El Bronze de Peteroa and in several others the shocks were violently felt. The most remarkable concomitant of this earthquake was the permanent elevation of the land for more than 100 miles along the coast. At Valparaiso the elevation was about three feet, and at Quintero four. It seems probable that this coast had been several times before raised in the same way.

20. Ditto, and at Valparaiso Three severe shocks; before 2 A.M., about

The day and night were hot and windy

Trans. Geol. Soc. *loc. cit.*

	2.	3.	4.	5.	6.
		4, and a quarter before 6 A.M. The earth trembled constantly between these shocks.			
Nov. 21	Chili, and at Valparaiso ..	At 2 ^h 30 ^m , 2 ^h 50 ^m , 7 ^h 45 ^m , 9 ^h 15 ^m , and 10 ^h 15 ^m A.M., and at 7 ^h 15 ^m and 2 P.M., severe shocks were felt.		The day and night were hot and windy	Trans. Geol. Soc. loc. cit.
—	Forb in Württemberg ..	A shock			
— 22.	Valparaiso	At 4 ^h 30 ^m , 7 ^h 30 ^m , and 9 ^h 15 ^m A.M., strong shocks. A little before 10 A.M. three loud explosions, after each of which the earth trembled. At 11 A.M. another severe shock, and between this and 1 P.M. three weak ones. The earth then remained quiet until 7 ^h 30 ^m P.M.		On this day there was a thick fog with cold fine rain.	Hesperus, 1822, 3 Dec. Trans. Geol. Soc. loc. cit.
— 23.	Ditto	The shocks were slight, and at greater intervals than before.			Ditto.
— 24.	Ditto	The earth shook violently up to 11 P.M. Two shocks ..			Ditto.
— 25.	Salz in Württemberg. Also felt at Altenseig and Heidelberg.			Accompanied by subterranean noise like thunder. v. Hoff gives the date Nov. 23.	Ann. de Chim. et de Phys. t. xxi. p. 393, t. xxiii. p. 406; Moniteur, 8, 12, 13 Dec.; Journ. des Débats, 6 Dec.
—	Valparaiso	At 8 ^h 15 ^m A.M. a severe shock, followed by others still shorter.			Trans. Geol. Soc. loc. cit.

1822. Nov. 26. Ditto	At 2 ^h 45 ^m A.M. a perceptible vibration, lasting nearly 2 min. From this time till the 18th Jan. 1823, shocks of more or less violence were daily felt. Those of the 10th and 25th December were the most severe.	On the evening of the 27th the country was visited by a tremendous storm of rain, accompanied by heavy gusts of wind, a meteorological phænomenon never before known to occur at this season; hence great terror was caused by it.	Ditto; Quart. Journ. Roy. Inst. vol. xvii. p. 44.
— — — 28. 10 ^h 50 ^m A.M.	Tübingen, Heidelberg, Strasburg, Kohl, Buol, Steinbach, Einzheim, Carlsruhe, Spires, and Stuttgart.	Herr v. Yelin (at Munich?) believed that the magnetic needle was affected by this earthquake.	Ann. de Chim. et de Phys. &c., quoted for the 25th; Hespérus, 1822, 3 Déc.; Schweigger, B. liii. (xxiii.) S. 49.
— — — About half-an-hour after midnight?	Mayence, especially on the bank of the Rhine.		Ditto.
— — — Dec. 1.	1. Island of Grenada in the West Indies.	Did great damage to buildings	Ann. de Chim. et de Phys. t. xxiv. p. 429; Archiv. des Découv. 1824, p. 210.
— — — 20.	Ditto	Enormous rocks were rolled down from the mountains.	Ditto.
— — — 24.	Komarom in Hungary		Férussac, Bull. des Sc. Nat. t. xviii. p. 195.
— — — 27. About 9 P.M.	Kadu in the island of Java.	Shocks, which continued for 30 hours.	Asiatic Journal, 1822, Dec.; Verneur, Journal des Voyages, t. xviii. p. 260; Férussac, Bull. des Sc. Nat. 1824, p. 328.
— — — 28.	Ditto	A more violent shock felt.	Ditto.
— — — 29. 1 ^h 30 ^m A.M.	The mountain Brome, at Passuruan in Java.	A shower of fine black ashes was thrown forth from this mountain. At the same time Merapi was in violent eruption. Four villages were burnt by the lava. The district of the island which had been convulsed on the 8th October, now remained perfectly quiet.	Ditto.
1823. Jan. 6.	Bergen in Norway		Keferstein.
— — — 9.	Lunrøe in Norway	One shock	Keilhan.

2.	3.	4.	5.	6.
a. 10. Lunroe in Norway — District of Orhuela in Murcia, Spain. The shocks were felt at Carthagena and Alicante.	Three shocks More than 200 severe shocks in 24 hours.		Several houses fell	Keithen. Ann. de Chim. et de Phys. t. xiv. p. 396; Férussac, Bull. des Sc. Math. Janv. 1831, p. 36.
— 15. Santiago in Chili	Severe tremblings ..			Garnier, <i>Météorologie</i> , p. 136.
— 24. Lunroe in Norway	One shock			Keithen.
— 25. Ditto	Two shocks ..			Ditto.
— 27. Ditto	One slight shock ..			Ditto.
— 29. Norrdelge, a town to the east of Upsal in Sweden.	An earthquake		Probably the same with the following	Ditto.
— 30. Ditto, and in the island of Aland in the Baltic, 11 geographical miles from Norrdelge.	At Norrdelge two shocks. In Aland one violent one.		In Aland accompanied by a subterranean noise	Ann. de Chim. et de Phys. t. xxiv. p. 429; Journ. des Débat, 17 Mars; Moniteur, 18 Mars; Poggendorff's Annalen, B. ix. S. 592.
— 15. Raripatz or Karipatz, a post station between St. Petersburg and Riga.	A rather severe shock followed, it appears, by another in February.			Ann. de Chim. et de Phys. t. xxviii. p. 406; Journ. des Débat, 17 Mars.
— In Chili	Six shocks ..		Perhaps the same with the earthquake mentioned on the 15th.	Ann. de Chim. et de Phys. t. xlii. p. 407.
b. 9. Columbo in Ceylon. Also felt at Kandy, Ratnapora, Matara, and Negumbo.	In Ceylon two shocks in half-a-minute ..	At 1 ^h 10 ^m p.m. the ship 'Winchelsea,' in lat. 1° 21' N., long. 85° 35' E., experienced a severe shock. The motion was tremendous, as if the vessel were passing over a coral reef. At the same time a loud rum-	Accompanied by subterranean noise like that of a cannonade. The Quart. Journ. gives the position of the 'Winchelsea' as 52° N lat., 85° 33' E. long., a manifest error. Before the shock an unusual oscillation of the barometer on board this ship, to the extent of .1 in., was observed. Since the afternoon of the 8th the mercury had fallen from 30.3 in. to 30 in. It rose again to its former level on the 11th. v. Hoff suggests a possible connexion between this earthquake and that in Moldavia on the 2nd March 2m	Trillock's Magazine, Jan. 1824, p. 24; Férussac, Bull. des Sc. Nat. 1824, t. i. p. 326; Edinburgh Journal of Science, 1826, April, p. 264; Quart. Journ. Roy. Inst. vol. xvi. p. 184; Monthly Magazine, vol. lviil. p. 530; Edinburgh Journal of Science, vol. iv. p. 261.

tion and noise continued two or three minutes. No motion was visible in the water. At 1 ^h 15 ^m the ship 'Orphens,' in 1° N. lat., 84° 6' E. long., felt a shock as if the vessel had touched the bottom. A confused grinding tremulous noise was heard for 60 or 65 secs. No ground on sounding within 20 fathoms. The shock was sufficiently strong to throw one of the compasses out of its place. At 2 ^h 5 ^m , in 1° 15' N. lat. and 84° 4' E. long., a second slighter shock was felt, and about 3 ^h a third, scarcely perceptible.				The earthquake is also reported as on the 10th at Jassy, but there is little doubt that the event is the same with that at Bucharest.	Ann. de Chim. et de Phys. t. xxiv. p. 429; Archiv. des Découv. 1824, p. 210.
					Poggendorff's Annalen, B. xxiv. (c.) S. 54.
					Ann. de Chim. et de Phys. t. xxxiii. p. 406.
				During a violent storm. The supposition that earthquake shocks were felt is somewhat confirmed by the fact, that an opening of a foot in width was observed next morning in the	Hespérus, 1823, Nr. 109. S. 436.

2.	3.	4.	5.	6.
<p>b. 25. Lunçé in Norway — 27. Foggia, San Severino, &c. in Apulia. r. 2. Madras and in Ceylon.....</p>	<p>Two shocks Severe shocks .. A severe shock, felt 20 minutes later at Travancore than at Madras.</p>		<p>street at the west end of the town, beneath which was a deep hollow. The opening gra- dually increased in width, but, by the falling in of earth, was closed below.</p>	<p>Keilhan. Ann. de Chim. et de Phys. t. xxiv. p. 429; Moniteur, 28 Mars. Archiv. des Découv. 1824, p. 210; Ann. Reg.</p>
<p>— 5. In Sicily. Very violent at Palermo. Several less severe shocks were felt from Cap- di-Orlando to Cap-di- Calavi. At Catania, Syracuse, and Tra- pani, and in general in the interior and south of the island, but little motion was perceived. At Alca- mo, however, eight leagues to the E. of Trapani, the shock was very strong. At Stromboli and Lipari the earthquake was very violent, and the centre of disturbance was probably about here.</p>	<p>Very violent. Five shocks at Palermo, lasting together 16 or 17 secs. Direc- tion N.E. to S.W. The first shock was indistinct, but tend- ing from below up- wards; the second was more severe, and undulatory; the third less strong, but of the same nature; the fourth was on the whole equal to the second, and the fifth, like the first, had an evident tendency upwards. At Galt- usetta five shocks, from N.E. to S.W., were felt in 9 secs. At Terrapilata the direction was S.E.</p>	<p>At Cefalu, 48 miles from Palermo, the waters of the sea came in in two suc- cessive waves of enormous size, and destroyed a build- ing.</p>	<p>At Palermo the water in the great basin of the botanical garden was raised up in the direc- tion of S.W., and the mercury in the seis- meter at the Observatory was put into violent motion, so that at the fifth shock it seemed as if boiling. The spear of a vane on the palace bowed to the S.W. at an angle of 20°, and remained so until the 9th, when it fell. A palm-tree, 30 feet high, was seen to bow its branches alternately to N.E. and S.W., almost to the ground. The clocks of the Observatory which vibrated from N. to S. and from E. to W. were stopped, and the actuating weight of one of them broke its crystal. Two small clocks vi- brating in the direction of the shock were not stopped. Great damage was done at Rocca- palombo, Pozzillo, S. Agata, Isello, Castel- luono, &c., and especially at Naso. The warm springs of Termini were troubled. At Terra- pilata clefts of 10 to 18 in. wide opened, and an eruption of mud and gas took place from the two mud volcanoes. At Palermo the fol- lowing night was stormy, with rain, thunder, snow, and hail.</p>	<p>Silliman's Journal, vol. ix. p. 215; Ann. de Chim. et de Phys. t. xxiv. p. 429; Moniteur, 28 Mars et 28 Déc.; Journ. des Débats, 31 Mars et 1 Avril; Ferrussac, Bull. des Sc. Nat. t. iv. pp. 7-9, t. v. p. 406, t. xiii. p. 33; Ferrara, Memoria sopra i tremuoti della Sicilia in Marzo 1823, Palermo, 1825; Edinb. Journal of Science, no. vii. p. 135, no. viii. p. 362.</p>

1823. Mar. 6. 1 ^h 45 ^m A.M.	6. S ^{ra} Lucia-di-Milazzo in Sicily, 6 miles from the shore. Also felt at Messina, but not at Palermo.	Violent shocks, recurring four times.	in the direction of Stromboli and Vulcano, not perceived at Palermo.	Accompanied by terrible noise	Ditto.
— 7. Palermo 10 ^h 56 ^m P.M.	7. Palermo	Another shock, from N.E. to S.W.			Ditto.
— 9.	9. In North-Eastern India, especially in the Neilgherry mountains. Also felt at Madras, though with less violence.				Asiatic Journal, 1823, Oct. p. 376; Férussac, Bull. des Sc. Nat. 1824, t. i. p. 326.
— —	— San Severino in Italy	A slight shock			Ann. de Chim. et de Phys. t. xxxiii. p. 406.
— 10. Ditto	10. Ditto	Ditto			Ditto.
— 11. Ditto	11. Ditto	Ditto			Ditto.
— 19. Lunrøe in Norway	19. Lunrøe in Norway	Two shocks			Keilhan.
— 24. Ditto	24. Ditto	Two more strong shocks.			Ditto.
— 26. Palermo	26. Palermo	Some more slight shocks.			Ferrara's memoir above quoted.
— 27. Island of Favignana, near Trapani, Sicily.	27. Island of Favignana, near Trapani, Sicily.	Strong trembling		Part of an ancient fortress fell, and twenty-two persons perished.	Ann. de Chim. et de Phys. loc. cit.
— 31. Messina 9 ^h 52 ^m P.M.	31. Messina	Slight vibratory shock.			Ditto; Ferrara, loc. cit.
— April 1. Castel-Buono in Sicily	1. Castel-Buono in Sicily	Another shock			Ferrara, loc. cit.
— 3. Calcutta 10 P.M.	3. Calcutta	Shocks from N. to S., and vice versa, up to 11 ^h .			Garnier, Météorologie, p. 137.
— 22. Island of Penang, Straits of Malacca.	22. Island of Penang, Straits of Malacca.	Two shocks			Ditto.
— 3 ^h 3 ^m A.M.	— Island of Martinique	A single shock			Ann. de Chim. et de Phys. t. xxiv. p. 429; Archiv. des Découv. 1824, p. 211.
— 5 ^h 45 ^m A.M.	—				Keilhan.
— May 6. Lunrøe in Norway	6. Lunrøe in Norway	Another shock			

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ay 7. B. harvest in Walactia.	A vertical shock . . .			Ann. de Chim. et de Phys. t. xxxiii. p. 406.
— 9. Ditto . . .	Another shock . . .			Ditto.
— 19. Aleppo . . .	Very violent shocks. The motion had continued more or less since January.			Journ. des Débats, 16 Juillet; Moniteur, 17 Juillet.
— 26. Ditto . . .	More shocks . . .			Ditto.
— 28. Castel-Buono in Sicily.	Another severe shock.			Ferrara, loc. cit.
— 30. Some places on the Canadian shore of Lake Erie.	An earthquake said to have been felt after the sudden agitation of the lake on this day.	The waters of Lake Erie rose suddenly to the height of 9 feet on the Canadian shore, carrying men and boats inland with irresistible force. The water then fell, and rose again twice to the height of 7 feet. In twenty minutes it resumed its original level, and all phenomenon was most remarkable at the mouths of the rivers Otter and Kettle. The water of the former was driven back a mile and a half.		Mai 1828, p. 130; Hortha, B. iii. 1825; Zeitung, S. 81; Trans. Lit. and Phil. Soc. New York, vol. ii. p. 1. § 25.
— 31. Borgo - San - Sopolaro, near the Tiber.	A slight shock . . .			Ann. de Chim. et de Phys. t. xxviii. p. 406.
— On board the ship 'Neuchus,' on her voyage from S. America to Calcutta. Her place	A severe vibratory shock, lasting nearly four minutes.			Monthly Magazine, vol. lviii. p. 530.

1823. June 12.	Palermo	Another shock		The remainder of the fortifications destroyed by an earthquake.	Poggendorff's Annalen, B.xxiv.S.54. Constitutionnel, 29 Juillet.
— 19.	Souli in Turkey				
— 30.	About Antioch in Syria.	Shocks were of almost daily occurrence here at this time, but at Aleppo they had become less frequent.		It had rained during the last week of May and the whole month of June. Rain is said to be rare in Syria from March to October.	Journ. des Débats, 1 Oct.; Moniteur, 5 Sept. et 3 Oct.; Ann. de Chim. et de Phys. t. xxxiii. p. 406.
— ...	In Chili	Two shocks during the month.			Ann. de Chim. et de Phys. t. xlii. p. 407.
— July 1 to 26.	In Iceland	Earthquake shocks		Accompanying three eruptions of the volcanos Koettegiaa and Orfieldajökul during this time. There had been no eruption for 68 years before.	Philos.Magazine, 1823, Sept. p. 233; Monthly Magazine, Nov. p. 312; Ann.de Chim. et de Phys. t. xxiv. p. 432; Constitutionnel, 11 Sept.; Journ. des Débats, 11 Sept. et 9 Oct.
— — 7.	On board the ship 'Layton,' in 35° 19' S. lat. (long. not given), near the island of Tristan d'Acunha. Also felt on board the Dutch ship 'Phelentait,' in 36° 51' S. lat.	A vibratory shock which wakened the crew.		The Ann. de Chim. et de Phys. gives the date 27th July.	Monthly Magazine, vol. lviü. Jan. 1825, p. 530; Ann. de Chim. et de Phys. t. xxx. p. 411.
— After 1 ^h 30 ^m A.M.	8. On board the same ship 'Layton.' Not felt by the Dutch vessel.	A stronger vibration than the last, of about 2 secs. duration. (The former shock lasted longer). Several shocks			Ditto.
— 13,	On the coasts of Val-demone, Sicily, at some days Messina, and on the south coast at some places in the Val-di-Note.				Ferrara, loc. cit.
— 18.	Sienna in Tuscany	A slight shock			Ann. de Chim. et de Phys. t. xxxiii. p. 406.
— Aug. 7.	Ragusa, and as far as 15 miles round it to seaward, and still further on the land	An earthquake		The island of Meleda remained almost at rest during this earthquake, though it was slightly perceived there.	Stulli sulla detonazioni dell'isola di Meleda, Biblioteca Italiana, vol. xxxiii. p. 347.

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side. Scarcely felt in the neighbouring islands.	ug. 10. Palermo. More slightly felt at different places in the Vo. Mazzaro.			Ferrara, loc. cit.
— 20. Ragusa and in Turkish Bosnia.	The sea retired nearly a mile from the coast.		Preceded by great heat, which occasioned contagious diseases. A meteor appeared immediately before the shock. In Bosnia much damage was done. Garnier records these facts in October.	Tilloch's Magazine, vol. lxii. p. 315; Ann. de Chim. et de Phys. t. xxxiii. p. 407.
— 22. Pawlowak in the government of Woronesch, Russia.	Slight shocks.		Ditto.	
— 23. Island of Meleda in the Adriatic.	A strong shock.		A mass of rock was moved from its place and rolled away. The detonations heard in this island in 1822 began again in this year, and were heard at different times from March to November (May and June excepted), and afterwards in the month of February 1825. They were occasionally accompanied by slight motion of the ground, but the present is the only distinct shock mentioned.	Paul Parfench, Bericht über das Detonations, Phänomen auf der Insel Meleda, u. s. w. Wien, 1826.
— 24. Ditto.	Slight shocks.		In Tilloch's Magazine the third day given for these shocks is the 27th.	Tilloch's Magazine, vol. lxii. p. 315; Ann. de Chim. et de Phys. t. xxxiii. p. 407.
— 25. Aix in Savoy.	Two shocks, of which the second was more violent than the first.		Constitutionnel, 5 Sept.	
— 26. Scala-Nova in Anatolia.	Rather violent shocks.		Houses were thrown down.	Moniteur, 23 Oct.
— 27. Valencia in Spain.	A very severe shock.		Accompanied by a rolling noise like that of a cannon.	M. Parrey's Memoir on Earthquakes in Spain and Portugal, p. 69.
— 28. 6 miles S. of the town of Meleda.				

1823. Sept. 12. About mid- night.	At the convent of St. Bernard.	A rather severe shock	.....	been tossed about as if by a whirlwind. As v. Hoff remarks, it is very doubtful whether this belongs to the class of earthquake phænomena.	Ann. de Chim. et de Phys. t. xxiv. p. 429; Archiv. des Découv. 1824, p. 211.
— Oct. 3. 1 A.M.	Island of Martinique	Two strong shocks	.....	Accompanied by loud noise	Ann. de Chim. et de Phys. t. xxv. p. 432.
— — — 8.	Lunrøe in Norway	Two shocks	.....	.....	Keilhau.
— — — 9.	Ditto	Three more shocks	.....	.....	Ditto.
— — — 11.	Ditto	One more shock	.....	.....	Ditto.
— — — 23.	Minschrift in Siberia	Slight shocks	.....	Accompanied by extraordinary heat	Ann. de Chim. et de Phys. t. xxxiii. p. 407.
— — — —	Fiorizano (or Fiorenzuola in the duchy of Parma?).	A slight shock	.....	.....	Ditto.
— Nov. 11. 5 ^h 45 ^m A.M.	Martinique and other West Indian islands.	Two severe shocks, of remarkably long duration.	.....	No remarkable damage done.	Ditto, t. xxiii. p. 378; Férussac, Bull. des Sc. Nat. 1824, t. ii. p. 236.
— — — 16.	Christiania in Norway	.....	.....	.....	Keilhau.
— — — 17.	Ditto	.....	.....	.....	Ditto.
— — — 19.	Santiago in Chili	A shock	.....	.....	Ann. de Chim. et de Phys. t. xlii. p. 407; Annual Register.
10 ^h 45 ^m P.M.	Freiburg in the Brisgau.	A vibratory shock	.....	At Breisach a loud noise was heard. At some other places there was only a low noise like a heavy gust of wind. The sound was heard at one or two places where the shock was not perceptible. The Ann. de Chim. et de Phys. make the hour 9 ^h 30 ^m .	Allgemeine Zeitung, 1823, Nr. 334; Arch. des Découv. 1824, p. 211; Ann. de Chim. et de Phys. t. xxiv. p. 429.
— 5 ^h 30 ^m P.M.	Also felt at Breisach, Strasburg, Kenzingen, and Schlettstadt.	from W. to E., lasting several seconds.	.....	.....	.....
— — — 23. 10 ^h 30 ^m P.M.	Arezzo and Sabbiano in Italy.	A slight shock	.....	Accompanied at Sabbiano by a noise like that of a gust of wind.	Ann. de Chim. et de Phys. t. xxxiii. p. 406.
— — — 24. 6 ^h 5 ^m P.M.	At Stockholm and some places in Dalecarlia, Sweden. On the same day a shock was felt at Christiania, Friedrichstahl, Mors, and Westhæa.	A slight shock, felt some minutes earlier in places situated to the west.	.....	Accompanied by a dull sound which seemed to come down from the atmosphere. Shortly after, there was a violent tempest. The shock was not at all felt at the bottom of the mines, but those who were on the ladders of the same were so shaken that they feared the ladders were about to fall.	Berzelius' Jahresbericht, Nr. 4. S. 268; Journ. des Débats, 25 Déc.; Moniteur, 26 et 27 Déc. et 4 Janv.; Keilhau.

2.	3.	4.	5.	6.
Nov. 26. Calcutta (A.M.)	A shock		Accompanied by subterranean noise.	Garnier, <i>Météorologie</i> , p. 139.
— 30. Island of Martinique (P.M.)	A strong undulation.	The sea rose after the shock, and occasioned some damage in the harbours.	Preceded by a very intense noise. The heat had been suffocating during the day. Abundant rain followed the earthquake and lasted ten days.	Ann. de Chim. et de Phys. t. xxx. p. 411.
c. Be- In the government of Taurida, Russia.	Rather severe shocks.			Ditto, t. xxi. p. 407.
— 4. Rome	A little shock			Ditto; Journ. des Dées, 23 Déc. t. Monteur, 24 Déc.
— 7. Bâle.	A vibratory shock			Mexian, p. 5.
— 13. Island of Martinique	Two shocks, slighter than those of November 11.			Ann. de Chim. et de Phys. t. xxi. p. 487.
— Belley in the depart- Ain, France.	Rather severe shocks, which lasted some seconds, and appeared to be from E. to W. Some persons at Belley asserted that they felt a former shock at 1 A.M.		Preceded by an explosion like that of large pieces of ordnance. An inhabitant of Bionces, who was on the top of a hill at the time of the shock, reported that the heavens appeared to him all on fire an instant after the explosion, although he saw no meteor.	Constitutionnel, 21 Déc.; Ann. de Chim. et de Phys. t. xiv. p. 429.
— Mühlheim in the Aus- sian province of Cleve- Berg.	One shock			Händlerberg Jahrbücher, 1825, Mai, S. 470.
en. 2. Yacac in China	Vibratory shock, lasting five seconds.			Asiatic Journal, 1824, Nov. p. 488.
— 5. Trinidad in the island of Cuba	A rather severe shock.			Ann. de Chim. et de Phys. t. xxv. p. 377; Archiv. des Découv. 1824, p. 212.
— 6. Bergen in Norway	Severe shocks from S.W. to N.E.		Accompanied by subterranean noise which lasted more than a minute.	Ditto; Monteur, 30 Fév.

1824. Jan. 7. Hartenberg in the circle of Elbogen, Bohemia. In the morning.	Another shock		The plaster was detached from the ceiling of a chamber in the castle.	Ditto.
2 ^h 30 ^m A.M.	Ditto	In the lower parts of the district of Weinsiedel in the Fichtelgebirge, near the Bohemian frontiers.	In some places accompanied by subterranean rolling noise.	Ditto.
9 ^h 15 ^m P.M.	Ditto	Hartenberg, Gossengrün, Silbergrün, Bleistadt, Annadorf, Schossent, Pirkles, Marklesgrün, Buterbach, Heinrichsgrün, and very violently in the mines of Primles.		Ditto.
11 P.M.	Ditto			Ditto.
2 ^h 45 ^m A.M.	Ditto			Ditto.
3 A.M.	Ditto			Ditto.
5 A.M.	Ditto			Ditto.
7 ^h 30 ^m P.M.	Ditto	Hartenberg	At 4 P.M. the ice on the Zwoda near Hartenberg broke up, although the temperature was only —70° Reaum.	Ditto.
9 P.M.	Ditto			Ditto.
11 P.M.	Ditto			Ditto.
11 ^h 15 ^m P.M.	Several other places in the Fichtelgebirge.			Ditto.
11 ^h	Ditto			Ditto.
10 ^h 45 ^m A.M.	Ditto			Ditto.
	Hartenberg			Ditto.
	Ditto	Ditto, rather more severe.	Accompanied by subterranean noise	Ditto.
Night between 11 & 12.				Ditto.

	2.	3	4.	5.	6.
an. 13	Several places in the Fichtelgebirge.	Another shock.			Authorities quoted above (on the 6th).
—	Ditto, and very strongly in the Bohemian Erzgebirge, especially in Pribus and Bleistadt, and most violently in Prunkles, Pernau, and Leopoldsdamm.	Ditto		Wells in the Erzgebirge which had been dry for years became suddenly full of water. This was remarked too at Adorf.	Ditto.
— 14.	Hartenberg in same region.	Slight tremblings, which recurred on several following days.		Accompanied by subterranean noise.	Ditto.
— 15	Boves in the province of Coni, Piedmont.	Three shocks, at the hours mentioned.		A meteoric stone fell on this day at Arenazzo near Ferrara (Chiadini).	Mém. de l'Acad. de Turin, t. xxix. p. 1.
— A.M.	In the district of Munich.	Another shock			Allgemeine Zeitung, &c., as above.
— In Chili (at Santiago?)	A severe shock				Ann. de Chim. et de Phys. t. xlii. p. 407.
— 18.	Hartenberg again	Two violent shocks.		Preceded by subterranean noise like thunder	Allgemeine Zeitung, &c., as above.
—	Ditto	Another shock		Accompanied by a strong west wind, a fall of snow, and a slight sinking of the mercury in the barometer.	Ditto.
—	Ditto	Ditto		Ditto	Ditto.
—	Ditto	Ditto		Ditto	Ditto.
— 19.	Ditto	A severe shock			Ditto.
—	Ditto	Ditto			Ditto.
—	Ditto	Ditto			Ditto.

1824. Jan. 19. 11 ^h 35 ^m A.M.	Hartenberg again	A severe shock	.....	.....	Ditto.
3 P.M.	Graalitz in same region.	Ditto	.....	.....	Ditto.
4 P.M.	Ditto, and at Eger, and Heinrichsgrün.	Ditto. Very severe at Heinrichsgrün.	.....	.....	Ditto.
4 ^h 30 ^m P.M.	Hartenberg again. (These shocks were felt, though slightly, at Falkenau and Ellenbogen; and more strongly at Stobzenhayn, Hobzbach, the Bohemian Wiesenthal, &c.)	The two most severe shocks felt at this place. The motion seemed to go from Graalitz to Eger, and thence to Hartenberg.	.....	On the 23rd of January a rapid fall of the barometer took place in Germany, France, all Italy, &c. In the after part of the day the mercury stood unusually low, and on the 24th it rose as rapidly as it had fallen. Kastner's Archiv, B. i. S. 125. B. ii. S. 394.	Ditto.
28. —	Lunrøe in Norway	One shock	.....	.....	Keilhau.
29. —	Ditto	Ditto	.....	.....	Ditto.
30. —	Ditto	Ditto	.....	.....	Ditto.
...	Manilla in the island of Luçon, Philippine Isles.	Terrible shocks	.....	After the shocks numbers of dead fish were seen floating on the surface of the river.	Garnier, <i>Météorologie</i> , p. 140.
Feb. 2. 9 A.M.	Again in the region of the Erzgebirge and Fichtelgebirge, especially at Heinrichsgrün.	The shocks began again.	.....	.....	Preuss, <i>Staatszeitung</i> , &c., as above.
11 P.M.	Ditto	Another shock	.....	The subterranean noise lasted an hour	Ditto.
2 A.M.	3. Ditto	Ditto, slight	.....	.....	Ditto.
6 A.M.	Ditto	Ditto, slight	.....	.....	Ditto.
10 ^h 45 ^m A.M.	Ditto	Ditto, severe	.....	.....	Ditto.
7 A.M.	4. Ditto	Two strong shocks	.....	.....	Ditto.
At Bobbio, 11 ^h 50 ^m P.M. At Voghese, 10 ^h (11 ^h ?) 56 ^m .	Bobbio in Italy (kingdom of Sardinia). Also felt at Ivree and Voghese.	At Bobbio two severe shocks. Three were felt at Ivree, and but one at Voghese. The latter was strong and lasted four minutes.	.....	Accompanied at Bobbio by noise like that of a storm.	Moniteur, 18 et 20 Fév.; Ann. de Chim. et de Phys. t. xxxiii. p. 406.

2.	3.	4.	5.	6.
<p>Feb. 5. Again in the Fichtelgebirge and Erzgebirge. Hattenberg was apparently the centre of all these shocks.</p>	<p>The general direction of all these shocks seemed to common observation to be N.E. to S.W. The shocks were more severe in the northern than the southern part of the district shaken.</p>	<p>The places at which these shocks of Jan. 6-19 and Feb. 2-5 were felt lie nearly together in a line from N.E. to S.W., on the southern slope of the Erzgebirge. On the south bank of the Eger no motion was observed. At Adorf and Munchberg, however, which lie out of the line mentioned, some motion was felt.</p>	<p>Keilbau. Poggendorf's Annalen, B. ii. S. 155; Ann. de Chim. et de Phys. t. xvii. p. 377. Ann. de Chim. et de Phys. t. xxiii. p. 407.</p>	<p>Prem, Staatszeitung, &c., as above.</p>
<p>— 7. Lunroe in Norway</p>	<p>Another shock</p>	<p>.....</p>	<p>.....</p>	<p>.....</p>
<p>— 11. Irkutsk in Siberia</p>	<p>A slight shock</p>	<p>.....</p>	<p>.....</p>	<p>.....</p>
<p>— 12. Egdisau in the Canton of Zurich.</p>	<p>A violent shock</p>	<p>.....</p>	<p>.....</p>	<p>.....</p>
<p>— 18. Sala in the province of Palermo (Parna?).</p>	<p>A strong vertical shock</p>	<p>.....</p>	<p>.....</p>	<p>.....</p>
<p>— Ditto</p>	<p>A very strong shock, at first vertical, afterwards horizontal, lasting six seconds.</p>	<p>.....</p>	<p>.....</p>	<p>.....</p>
<p>— 21. Island of St. Maura (Ionian Isles).</p>	<p>A violent shock</p>	<p>.....</p>	<p>.....</p>	<p>.....</p>
<p>far. 3. Cheny in the department of Rhone, France.</p>	<p>A strong shock said to have been felt.</p>	<p>.....</p>	<p>.....</p>	<p>.....</p>
<p>— 4. Pieve-Santo-Stefano in Tuscany.</p>	<p>A strong undulatory shock from W. to E.</p>	<p>.....</p>	<p>.....</p>	<p>.....</p>
<p>— 8. Irkutsk in Siberia</p>	<p>Three severe shocks</p>	<p>.....</p>	<p>.....</p>	<p>.....</p>

1824. Mar. 12. foot of the Kholzoun range in the S.W. of the Altai Mountains.	Another shock	.....	.....	Keilhau.
— 16. Lunrøe in Norway	A strong horizontal shock.	.....	.....	Ann. de Chim. et de Phys. t. xxxiii. p. 407.
— 27. Lunrøe in Norway	Another shock	.....	.....	Keilhau.
— April 1. In the mine of Zmeinogorsk and at Zyrianof in the Altai Mountains.	One shock	.....	.....	Férussac, Bull. des Sc. Nat. t. xi. p. 420.
— 10. Kingston and other places in Jamaica. At Spanishtown and Old Harbour the shocks were very strong.	Very severe shocks. The motion lasted about 30 seconds, and was the most violent felt for many years. Followed by other slighter shocks from the 10th to the 15th. At Yallahs there were shocks during the night of the 13th and between 1 and 2 A.M. on the 14th. At Port Royal on the 12th about 9 ^h 48 ^m P.M., and on the 13th at about the same hour. A terrible earthquake	.....	.....	Ann. de Chim. et de Phys. t. xxvii. p. 377; Verneur, Journal des Voyages, t. xxiii. p. 101.
— 20. Island of St. Thomas, West Indies.	.....	.....	Accompanied by a noise like thunder. Many people were thrown out of their beds. A building was swallowed up in consequence of this commotion.	Ann. de Chim. et de Phys. t. xxvii. p. 377.
— May 4. Lunrøe in Norway	Another shock	.....	.....	Keilhau.
— 31. Burg in Prussia	A slight shock.	.....	.....	Ann. de Chim. et de Phys. t. xxvii. p. 377.
— June 2. Schiraz in Persia.	Some slight motion	.....	.....	v. Hoff.
—	premonitory of the great earthquake of the 25th.	.....	.....

1.	2.	3.	4.	5.	6.
June 6, Port-au-Prince in Domingo.	St One shock				Moniteur, 35 Janv. 1826.
— 10. Siena in Italy	... A strong shock				Ann. de Chim. et de Phys. t. xxiii. p. 406.
— 19. St. Helena				A large mass of rock fell from the side of Loddies Hill. Perhaps not an earthquake shock.	Constitutionnel, 27 Août.
— 23 In Persia, particularly at Schiraz.	A violent shock, followed by many slighter ones for six days and nights. The principal damage was done by the first and three others which followed it before 10 A.M.			A part of the city of Schiraz was almost completely destroyed and swallowed up. Next to this city Kazroun suffered most. In the neighbourhood of the latter place some mountains were levelled. The day of the most violent shocks was, according to the Persian calendar, the 27th of the month Chaval, in the year 1239. The month of April has been erroneously given as the date of this event. (On the same day there was a renewal of the eruption of Gunung Api in the island of Bantua, which began on June 9.)	Verneur, Journal des Voyages, t. xxv. p. 118 (from the Bombay Courier); Revue Encycl. 1825, Mars, p. 846; Hertha, H. i. 1825, &c.
July 9, New Brunswick, North America.	A severe shock			Accompanied by an explosion like that of a piece of ordnance.	Ann. de Chim. et de Phys. t. xxvii. p. 377; Arch. des Découv. 1824, p. 213.
— 15. Monte-Rotundo in the States of the Church.	Ditto			On the 19th (or 29th?) of July there was an extraordinary commotion in the lake of Massaciucoli, territory of Lucce, attended with a sulphurous smell. Numbers of small fish died.	Ann. de Chim. et de Phys. t. xxiii. p. 407, t. xxvii. p. 366; Kastner's Archiv, H. iv. S. 383.
— 18. In the departm. of Pyrénées, Aude, Tarn, &c.	At Roussillon the shock appeared to be from N.E. to S.W., and lasted four or five seconds.			At Collioure a subterranean noise preceded the shock, and continued four or five seconds after it. At Mont-Louis the atmosphere had been clear and calm all day, but immediately after the shock a violent storm arose. At Perpignan the thermometer rose in the evening to 33° C., and the air seemed to be filled with burning vapours. At Carcassone there was a blast of wind so impetuous that the inhabitants compared it to the explosion of a gun. All points of the horizon had been illuminated during the day.	Le Constitutionnel, 28 Juillet; Ann. de Chim. et de Phys. t. xxvii. pp. 216 et 377; Arch. des Découv. 1824, p. 213.

1824. July 19. Lisbon	A slight shock.....	.....	The thermometer rose on this day to 40°·5 C. in the shade.	Moniteur, 11 Août; Constitutionnel, 10 Août; Ann. de Chim. et de Phys. t. xxvii. p. 377.
— 29 — to 31.	Lanzerote, Cañary Isles .....	.....	Accompanied by subterranean noise. On the 31st the earth opened and a volcanic eruption began, which lasted until next day. Three other craters afterwards opened, and large masses of lava, vapour, and salt water were ejected. The account is not clearly given, and the 29th of August is wrongly recorded as the date of the commencement, by the Moniteur. The eruption continued until October or even November.	Moniteur, 24 Janv. 1825; Férussac, Bull. des Sc. Nat. t. v. p. 45; t. x. p. 45; Ann. de Chim. et de Phys. t. xxvii. p. 382; Constitutionnel, 23 Oct.; v. Buch, Beschreibung der Canarischen Inseln.
— Aug. 1 — and 2.	Granada in Spain .....	.....	.....	Ann. de Chim. et de Phys. t. xxvii. p. 377.
— 8. — In the morning.	Comrie in Perthshire ...	.....	Accompanied by noise as of a heavy carriage rolling upon pavement.	Ditto.
— 10. — — 13. — Early in the morning.	Perth .....	.....	Accompanied by very loud noise	Ditto, t. xxxiii. p. 408.
	San - Pietro - in - Bagno, and Salvapiana in Tuscany.	.....	Before these shocks a mist of a peculiar character had been observed in the atmosphere, especially round the sun. A traveller had remarked a fire-ball the night before.	Ditto, t. xxvii. p. 377; Preuss. Staatszeitung, 1824, Nr. 217. S. 954.
— 18. —	Harderwyk in Holland..	.....	Accompanied by loud noise like that of a carriage rolling rapidly over an uneven pavement.	Ann. de Chim. et de Phys. t. xxvii. p. 377; Constitutionnel, 7 Sept.; Revue Encycl. Oct. p. 244.
— 24. — — 29. — 2 and 9 A.M.	Lunrøe in Norway .....	.....	.....	Keilhau.
	In Chili. (At Santiago?)	.....	.....	Ann. de Chim. et de Phys. t. xlii. p. 407.
— Sept. 2. — 5 A.M.	In the mine Klintch-kinak, 167 wersts from Nertschinsk in Siberia.	.....	Preceded by an extraordinary noise, passing from N. to S., which lasted four minutes. All the buildings rocked. This is said to have been the first shock felt since January 1800.	Férussac, Bull. des Sc. Nat. t. viii. Mai, 1826, p. 21, quoting Sibirsky Vestnick, 1824, Nra. 15 and 16, p. 97.
— 5. —	Lunrøe in Norway .....	.....	.....	Keilhau.

2.	3.	4.	5.	6.
Island of Guadeloupe ...	Several shocks.....	.....	A terrible storm during the night, with thunder and lightning, and on the following morning, heavy rain. Between 1 and 2 A.M., when the storm was at its height, the barometer fell 7 lines below its ordinary height; there an imbecil of occurrence.....	Journal de Frankfort, 1824, Nr. 325; Ann. de Chim. et de Phys. t. xxiii. p. 408; Constitutionnel, 3 Sept.
9. Basse-terre in the same island.	Some more shocks ...	On the 13th a remarkable and irregular rise and fall of tide at Plymouth.	.....	Constitutionnel, 16 Nov.; Archiv. des Dénouv. 1824, p. 215.
Oct. 3. Martinique in the West Indies.	Two shocks.....	.....	People were awakened by the shocks, but no damage was done.	Ann. de Phil. 1824, Sept. p. 204; Ann. de Chim. et de Phys. t. xxiii. p. 408.
26. Manila in the island of Luzon, Philippine Isles.	Slight shocks had been felt here in the former part of the month, but that of this day was the most violent which had been felt since 1795 (or 6?).	.....	Some churches, one of the bridges, and many private houses fell. The barracks were completely ruined, so that a camp had to be formed, which was itself destroyed by a tempest on the 1st of November. About four miles from the city the ground opened, and dead fish were observed immediately after floating on a river near.	Singapore Chronicle, 25th November 1824.
Island of Meleda in the Adriatic.	A shock which made the windows rattle.	.....	Detonations were heard in this island on the 14th, 25th, 28th, and 29th of October, and 1st, 2nd, 11th, 12th, and 15th of November, unaccompanied by any shock.	Paul Partsch, Bericht, u.s.w.
28. Duboussar in the Caucasus.	Rather severe shocks.	.....	On the 1st of November a violent tempest blew over the Crimea.	Journal de Frankfort, 1825, Nr. 9.
29. Clumbery in Savoy, and the neighbourhood.	A slight shock.....	.....	.....	Ann. de Chim. et de Phys. t. xxvii. p. 377, t. xxviii. p. 408; Constitutionnel, 20 Nov.
Mühlheim, Stornberg, and Schramberg, in the Brägau.	Shocks from S. to N.	.....	At Brunswick some persons supposed they felt a shock during a storm on this night.	Allgemeine Zeitung, 1824, Beil. 341.
30. In the West Indies. (At Martinique?)	More shocks.	.....	.....	Ann. de Chim. et de Phys. t. xxviii. p. 408.
Mayence	A vibratory shock	.....	A gun-ball was also observed	Allgemeine Zeitung, 1824, Beil. 225.

30. 3 ^d 30 ^m P.M.	Island of Martinique, West Indies.	A severe shock	At St. Pierre a very high tide threw many ships upon the strand.	part of this year, vid. v. Hoff, Th. v. S. 216. Accompanied by subterranean noise, which appeared at first, however, to proceed from the atmosphere. The earthquake was preceded by great heat, which ceased after the shock, and heavy rain began, which lasted for ten days. Caused no damage. At the first named place extremely hot weather followed the shock, at the second heavy rain.	Revue Encycl. 1825, Fév. p. 542; Férussac, Bull. des Sc. Math. t. iii. p. 363, t. vi. p. 17; Ann. de Chim. et de Phys. t. xxxiii. p. 408.
During the last few days.	Catanzaro and Cosenza in Calabria.	Several shocks			Journal de Frankfort, 1824, Nr. 359.
Dec. 6. 2 ^d 45 ^m P.M.	Portsmouth, Havant, Bognor, Aldwick, Emsworth, and Chichester on the south coast of England.	A trembling of three to five seconds' duration, during which the ground seemed to heave a little.		Windows rattled, and objects which were freely suspended swung about. In the morning the sky was full of electrical clouds. After the shock a S.W. wind arose. No similar phenomenon had been felt in this part of the country since 1812, the date of the great earthquake of Caraccas.	Philos. Magazine, 1825, Jan. p. 70; Férussac, Bull. des Sc. Nat. t. vi. p. 186; Journ. des Débats, 12 Déc.
8. — — — — —	Lunrøe in Norway	Three shocks			Keilhau.
— — — — —	Palermo	A shock			Poggendorff's Annalen, B. xxiv. S. 54.
10. — — — — —	Corigliano and Longobucco, not far from Rosano, in Calabria Citeriore.	Several shocks.....		Houses were thrown down. Three persons perished.	Journ. de Frankfort, 1824, Nr. 364; Preuss. Staatszeitung, 1825, Nr. 3. S. 20; Constitutionnel, 30 Déc.
— — — — —	Fourteen or fifteen leagues to the north of Mariquita in the republic of Venezuela, South America.	Very severe shock		Not felt at Mariquita	Ann. de Chim. et de Phys. t. xlii. p. 411; Férussac, Bull. des Sc. Nat. Janv. 1831, p. 16.
6 ^h 23 ^m P.M.					
11 P.M.	Ditto, at Mariquita itself.	The most violent earthquake felt here during this year.		Bells were made to sound. M. Roulin says that two or three years pass without any earthquake being felt in the territory of Venezuela, that then, after a dry and hot summer, the shocks recommence, increase in intensity and frequency until ten or twelve occur in the same day, and on the fall of the first winter rains, suddenly cease. Great irregularity prevails in the propagation of these shocks, and often no correspondence can be traced in them at places very near each other. The barometer is not influenced by them.	Ditto.

2.	3.	4.	5.	6.
ec. 23. Hamburg. Also at Alf. Shocks supposed to ter, a village two miles have been felt. At and a half from Bonn Alfier there were on the Rhine. two.	Jan. 5. Schiraz in Persia. Several shocks. Pruichdorf in the Car-A slight tremulous ton of Worth, arrow- shock, lasting 40 or dissement of Weisen- 45 seconds.	On the 3rd the sea rose and felt in an unusual way at Co- penhagen.	During a violent storm at Hamburg. At Alfier, the beds are said to have swung from side to side.	Journal de Frankfort, 1825, Nr. 2; Gothaische Zeitung, 1825, Nr. 4; Journ. des Débats, 6 Janv. 1825.
— 30. Schiraz in Persia. Several shocks. Pruichdorf in the Car-A slight tremulous ton of Worth, arrow- shock, lasting 40 or dissement of Weisen- 45 seconds.	burg, Alsée. Also felt at Lamperteloch. Cosenza, Rossano, and A slight shock, most Congliano, in Cala- strongly felt at the bria Ultra. last two places.			Journal de Frankfort, 1825, Nr. 50. Constitutionnel, 20 Janv.; Ann. de Chim. et de Phys. t. xxx. p. 412.
— 13. Saint-Pierre in the island of Martinique.	A slight shock	The temperature had been very high up to the moment of the shocks.		Journal de Frankfort, 1825, Nr. 41.
— 17. Florence	Two ditto			Cuvier, Hist. des Sc. Nat. t. ii. p. 247. Ann. de Chim. et de Phys. t. xxx. p. 412, t. xxxiii. p. 408; Consti- tutionnel, 9 Mars; Journ. des Dé- bats, 10 Mars. Ditto.
— 18. Teramo in the Abruzzo, Italy.	Another shock			Kallien. Ann. de Chim. et de Phys. t. xxx. p. 412, t. xxxii. p. 408; Ferussac, Bull. des Sc. Nat. t. v. p. 48.
— 19. Island of St. Maure, 10- noon. 45".	A violent earthquake.		Many of the inhabitants perished. At Pre- vessa also houses were thrown down, and the earth opened. Heavy rain followed the earth- quake, and lasted several days.	t. xi. p. 199; Constitutionnel, 9 Mars; Journ. des Débats, 10 Mars; Preuss. Staatszeitung, 1825, Nrs. 63 u. 82. Ditto.
— 20. Ditto	More shocks		Two small houses were thrown down	
— 4 A.M. Iceland, in the southern quarter of the island.	Severe shocks. Seve- ral others were felt in the northern part of the island during the month.		Some time before, violent storms and disastrous inundations had been experienced.	Journal de Frankfort, 1825, Nr. 126; Ann. de Chim. et de Phys. t. xxx. p. 412.

1 P.M.					Accompanied by loud subterranean noise.....	B.ii.S.283; Constitutionnel,30 Janv. Féruassac, Bull. des Sc. Nat. t. viii. p. 329, t. xi. p. 420, quoting Asiatsky Vestnik, 1825, Mars, p. 285.
— 28. Midnight.	In the mines of Zyrianof, district of Koliwano, Woskressensk, between the Irtisch and Buktarma, at the foot of the Khobzoun range, Altai Mountains.	A shock from E. to W.; strongly felt on the surface of the ground.			Accompanied by rather loud rolling noise.....	Ann. de Chim. et de Phys. t. xxxiii. p. 408.
— 30.	Stanza - Protsch - Nookopsin on the right shore of Lake Kouban, Russia.	A shock				
— Feb. 3.	Lunroe in Norway	One shock	On the 3rd, 4th, and 5th, a violent storm raged in the German Ocean.			Keilhau.
— 4.	Ditto	Ditto				Ditto.
— 5.	Ditto	Ditto				Ditto.
— 7.	Ditto	Ditto				Ditto.
— 18. 8 ^h 15 ^m P.M.	Sienna in Tuscany	An undulatory shock, lasting four seconds. Followed, three minutes after, by a second, slighter. A third, still more feeble, occurred at 1 A.M.			During the first shock the bells rang in the upper stories of the houses, and a loud noise was heard, apparently coming from the west. The sky was obscured by clouds, and a very fine rain fell. The barometer was very high, and about 10 P.M. the sky became clear.	Ann. de Chim. et de Phys. t. xxxiii. p. 408; Féruassac, Bull. des Sc. Nat. t. v. p. 407, quoting Antologia di Fiorenza, 1825, Fév. p. 136.
— 21. 0 ^h 30 ^m A.M., 4 A.M., and 7 A.M.	Neighbourhood of St. Veit near Klagenfurt in Carinthia. Most strongly felt through the Glantal as far as Wicking and Eberstein. The motion did not extend far.	The first shock was very slight; the second was more severe and lasted several seconds; and the third was again but slight. Direction = S.W. to N.E.			The second shock was severe enough to injure buildings, &c. The third was accompanied by subterranean noise like thunder. Horses, dogs, and birds showed symptoms of fear.	Klagenfurter Zeitung; Preuss. Staatszeitung, 1825, Nr. 57. S. 227.
— 24. 6 ^h 30 ^m P.M., and about 11 ^h 30 ^m P.M.	Ditto	Two more slight shocks.				Journ. des Débats, 14 Mars.

2.	3.	4.	5.	6.
Island of Meleda in the Adriatic.	Four violent shocks during the month, and several slighter disturbances.		On February 8, 12, 13, 15, 16, 18, 19, 22, 26, and 28, the peculiar detonations were heard in this island.	Paul Partsch, Bericht, u.s.w.
On board the ship 'Beccary,' on her voyage from Madeira to Honduras, near the island of Roatan in Honduras Bay.	A shock which seemed as if the vessel had struck on a bank.		During very gloomy weather. Said to have been felt also at the same time at Balize on the peninsula of Yucatan.	Edinburgh Journal of Science, 1826, Jan. p. 70.
Ar. 2. Algiers and the country about, lying in a line from N.E. to S.W., or from Algiers towards the Canary Isles.	Violent undulatory motion, lasting 55 seconds. During the next four days ten more shocks of less violence were felt.		Some hours before this first shock all the springs and wells dried up. Great damage was done at Algiers, and the town of Blida, eight miles to the S.W., was almost entirely ruined. 7000 (or, according to others, 15,000) persons losing their lives. Near Blida also two hills are said to have been thrown together, and a village buried between them.	Moniteur et Constitutionnel, 28 Avril; Allgemeine Zeitung, 1825, Nr. 107; Ann. de Chim. et de Phys. t. xxx. p. 413; Monthly Magazine, vol. ix. Nr. 417. p. 463.
— 14. Turin, Rivoli, &c. ...	A slight shock			Journ. de Savois, 1825, Avril, p. 254; Ann. de Chim. et de Phys. t. xxxiii. p. 408.
April 6. Saldenhofen in Styria.	Vibratory shock		Accompanied by noise like thunder	Wiener Zeitung, 1825, 26 Avril.
— 10. Sala in Principato Ulte. Slight vibratory shock	Slight vibratory shock from W. to E.			Kastner's Archiv, E. xiv. S. 318.
— 11. Lagonegro in the Basilicata, kingdom of Naples.	Undulatory, more severe than the last, of four seconds' duration, and ending with a vertical shock.		The Ann. de Chim. et de Phys. gives the date April 14.	
— Caracass in S. America.	A violent shock			Ann. de Chim. et de Phys. t. xxx. p. 413; Moniteur, 15 Jan.; Journ. des Délégués, 14 Jan.
— 17. Lunde in Norway	Four trifling shocks.			Kellian.
— Islands of Sumbava, Java, Borneo, and Celebes.	A violent earthquake, lasting eleven days in Sumbava.		The earthquake ended in Sumbava by an eruption of the volcano Tombora, which covered part of the island with pumice. Many of the harbours were raised, and some of the	Fourier's Notizen, E. ix. Nr. 8. (Nr. 436.) S. 114, quoting van Rossum.

.....	....., and several two or three secs.	.....	ON THE 2ND.	.....
3. Soon after midnight (of the 2nd?)	A slight shock, follow- ed by a second at 4 P.M.	Aquila in the Abruzzo Ulteriore.	.....	Ann. de Chim. et de Phys. t. xxxiii. p. 408.
24. 3 ^h 30 ^m and 9 ^h A.M. (P.M. ac- cording to the Ann. de Chim. et de Phys.).	Two shocks, each last- ing three seconds.	Catanzaro in Calabria Ultra.	.....	Ditto; Kastner's Archiv, loc. cit.
28. 3 P.M.	Another slight shock	Ditto	.....	Ditto.
At the end of the month.	.....	At Mexico	Accompanied by subterranean rolling noise. The shock was considered but a common and little remarkable event by the inhabitants.	Hertha, B. v. 1826; Geogr. Zeitg. S. 72.
June 7. At night.	A slight shock, lasting three seconds. A severe shock	Smyrna	.....	Ann. de Chim. et de Phys. t. xxxiii. p. 409. Ditto t. xlii. p. 407.
12. 2 A.M.	Very severe shocks, which recurred for several days. A slight shock.	In Chili (at Valparaiso or Santiago?).	.....	Ditto, t. xxx. p. 413; Moniteur et Constitutionnel, 19 Juillet.
July 2.	An earthquake	Algiers and neighbour- hood.	.....	Moniteur, 28 Juillet. Allgemeine Zeitung, 1825, Nr. 252. S. 1008.
7. Faenza in Italy	The river Don was in a state of violent agitation, as if dis- turbed by a storm.	.....	.....	Preuss, Staatszeitung, 1825, Nr. 218. S. 871.
21. Pawlowsk in the govern- ment of Woronesch, Russia.	.....	.....	.....	Ditto.
25. Rossano in Calabria Ci- tra.	.....	.....	.....	a mile (Italian?) from Orsomarso dried up. On the 26th and 27th, one of the most tremen- dous hurricanes on record occurred in the West Indies.
27. Orsomarso in the same province.	.....	.....	.....	This account refers, in all probability, to the same event as that given on the 2nd July, the latter being the correct date.
Aug. 2.	.....	Algiers	.....	Gentleman's Magazine, vol. xcv. pt. 2. p. 172.

2.	3.	4.	5.	6.
Aug. 17. Nieder-Herrbach in 10 Hesse Darmstadt.	Several shocks		Windows rattled, and doors, stoves, &c. were set in motion.	Gothische Zeitung, 1825, Nr. 136.
— 20. Kingston in the island of St. Vincent, West India.	Two severe shocks, with scarcely any interval.			Moniteur, 18 Oct.; Ann. de Chim. et de Phys. t. xxxiii. p. 409.
— 21. Cairo in Egypt. 3 P.M.	Four rather severe shocks. They seemed to come from due north.		The Egyptians attributed these shocks to the comet which appeared in the following October.	Nouv. ann. des Voyages, t. xviii. Déc. 1825, p. 428.
— 25. Leghorn	Two distinct undulations.			Moniteur, 8 Sept.; Ann. de Chim. et de Phys. t. xxxiii. p. 408.
— Ditto, and at Genoa	At Leghorn a slight undulation from E. to W. At Genoa the shock was very strong, and lasted 5 or 6 seconds.			Ditto.
pt. 1. Harbour of Peter and Paul, Kamtschatka.	An earthquake, of 9 secs. duration.			Allgemeine Zeitung, 1826, Nr. 205. S. 620.
— 7. Orsomarso in Calabria Citra.	A slight shock.		A spring which rose half a mile from the place ceased to flow. The account probably refers only to the same event as that given on 27th July.	Ann. de Chim. et de Phys. lor. cit.
— 20. Demerara in the north of S. America. Also felt at the same time in the islands of Barbadoes and Trinidad.	The most severe shock felt for many years in Demerara. It was oscillatory, in the direction W. N. W. to E. S. E., and lasted 3 or 4 minutes (secs.?). Followed by a lighter shock an hour afterwards.	The sea was agitated by an oscillatory motion analogous to that felt on shore.	Accompanied in Demerara by a dull heavy noise. There was a light wind from the N. W.; the atmosphere was clear about the zenith, but clouded in the northern horizon. The second shock was attended by a sudden gust of wind. In the island of Trinidad several houses were thrown down.	Allgem. Konst. en Letterbode, 1825, 2 Dec.; Ann. de Chim. et de Phys. t. xxi. p. 412.
L. 3. In the West India (in A. which island is not mentioned).	A vibratory shock			Leonhard's Zeitschrift, 1826, B. II. S. 360.
— 5. Harbour of Peter and Paul, Kamtschatka.	An earthquake, of 3 secs. duration.			Allgemeine Zeitung, 1826, Nr. 205.

1825. Oct. 23. Aquila in the Abruzzo, About 8 ^h and 8 ^h 30 ^m P.M.	The first shock was very severe, and of rather long duration. The second was slighter.	.....	Oct. 17-20, the barometer was unusually low in N. Germany, and it blew a violent storm.	Kastner's Archiv, B. xiv. S. 323; Ann. de Chim. et de Phys. t. xxxiii. p. 408.
— 24. Ditto 3 A.M.	Another shock, followed by three more during the ensuing evening and night. A shock almost as severe as that of the year before.	.....	Ditto.	
— Towards the end of the month.	Schiraz in Persia.....	.....	Numbers of buildings were reduced to ruins ...	Madras Courier, Journal Asiatique, 1826, Jun. 3. p. 800; Monthly Magazine, 1826, July, p. 74.
— Nov. 7. Harbour of Peter and Paul in Kamtschatka. 10 ^h 33 ^m A.M.	An earthquake of 20 secs. duration.	.....	.....	Allgemeine Zeitung, 1826, Nr. 205. S. 820.
— 19. Port-an-Prince in Haiti. In the morning.	Violent shocks, lasting four or five seconds. This is said to have been the third earthquake of the year.	.....	Accompanied by a dull noise coming from the S.E.	Ann. de Chim. et de Phys. t. xxx. p. 413; Moniteur, 25 Janv. 1826.
— 30. In the West Indies. In which of the islands is not mentioned.	Shocks.....	.....	The subterranean noise accompanying these shocks was more distinct, and louder than on former similar occasions. Preceded for several days by heat of very unusual intensity for this time of year. Immediately after the earthquake the weather became cooler, and heavy rain with thunder set in and lasted for ten days.	Leonhard's Zeitschrift, 1826, B. ii. S. 360.
— Dec. 8. Geneva. Between 10 and 11 P.M.	A severe shock	.....	.....	Journ. des Débats et Constitutionnel, 19 Déc.; Ann. de Chim. et de Phys. t. xxx. p. 414.
— 23. Strasburg, Kehl, Sundheim, Neumühl, Kork, Offenhurg, and very slightly at Mannheim. 5 A.M.	Shocks, which were strongest at Strasburg, and were there in the direction N.E. to S.W., or N. to S. At Strasburg the watchman attached to the cathedral felt his bench shaken	.....	At Strasburg the weather was calm and the sky overcast. A slight wind blew from the south. The barometer was at 27 in. 11 lines, about 2 lines below the mean height, and the thermometer at +1°·25 R. An extraordinary bellowing sound had been heard in the air between 3 and 4 A.M. Dec. 6-9, violent storms and inundations on the coasts of the Mediterranean and Adriatic.	Constitutionnel, 28 Déc.; Ann. de Chim. et de Phys. t. xxx. p. 414; Allgemeine Zeitung, 1825, Nr. 363. S. 1451 u. Beilage, Nr. 365; Preuss. Staatszeitung, 1826, Nr. 8. S. 33.

1.	2.	3.	4.	5.	6.
Dec. ...	Admont in the circle of Judenburg in Styria.	about 45° 45", and then three or four shocks ensued.		Accompanied by subterranean noise	Leonhard's Zeitschrift, 1826, II. II. S. 636.
Jan. 7.	Island of Martinique ...	An earthquake, consisting of two shocks; the one slight, the other violent.		The inhabitants were alarmed by the stronger shock of the two, but no damage was done.	Ann. de Chim. et de Phys. t. xxxiii. p. 412; Revue Encycl. Mars, p. 866.
— 23.	Lunrue in Norway	A severe shock		The town was much injured	Kellbau. Constitutionnel, 9 Mars; Ann. de Chim. et de Phys. t. xxxiii. p. 409; Allgemeine Zeitung, 1826, Nr. 63. S. 352.
— 26.	Preveza in Albania. ...	A violent shock		Accompanied by a hurricane or typhoon, which raised the sea twelve feet above its ordinary level.	v. Humboldt, Fragmenta de Géologie et de Climatologie Asiatique, t. i. p. 228; Beechey's Voyage to the Pacific (London, 1831), pt. 2. p. 313.
Feb. 1.	In the Baribata, kingdom of Naples. Also (two shocks) felt at Naples and Avellino, the hour however not being given. The pieces shaken lie in a line running nearly due E. and W.	A shock, which was at first vertical, and then became horizontal, and undulatory from N. to S., and lasted more than 20 secs. Two other shocks followed, with an interval of half an hour.		Houses were thrown down in the commune of El Tito (Huot, in his 'Cours de Géologie,' records the earthquake at this place as occurring at the end of February), and Potenza also suffered. The weather had been cold and rainy up to the 29th January, but on the 1st February almost unbearable heat set in. Smoke issued for several days about this time from Vesuvius. V. Hoff gives a separate account, identical with this, on the 1st Feb. 1827, but there was probably but one earthquake, that here recorded.	Journ. des Débats, 21 Fév.; Moniteur, 24 Fév. et 7 Mars; Preuss. Staatszeitung, 1826, Nr. 55. S. 220.
— 8.	Constantinople and (at same hour) Smyrna.	Constantinople three severe shocks from N. to S. Dec.			Constitutionnel, 31 Mars; Ann. de Chim. et de Phys. t. xxxiii. p. 409;

1826. Feb. 21. 9 P.M.	Tornea in Lapland	ring the night some other slight shocks were felt. At Smyrna the shock was but little remarkable. An earthquake, lasting one minute. Direction = S. to N.	.....	On the 20th it blew a violent storm from the south for nearly 24 hours. At the time of the earthquake the atmosphere was calm and clear. A sound which, at first dull and low, changed to an alarming rattling noise, accompanied the shock. Buildings shook.	61. S. 241; Allgemeine Zeitung, Nr. 89. S. 356.
---	Lunrøe in Norway	Another shock, probably at the same time as that at Tornea.	.....	.....	Keilhan.
--- 26.	Brieg in the Valais	Violent tremulous shocks; the most severe which had been felt at this place since 1817.	.....	Preceded by a dull noise. The houses were shaken. It does not seem certain whether this event occurred in 1826 or 1827.	Férussac, Bull. des Sc. Nat. t. xii. p. 362.
--- Mar. 18. 0 ^h 20 ^m A.M.	Pesaro in the States of the Church.	A rather severe shock from S.E. to N.W.	The sea was a little agitated.	.....	Ann. de Chim. et de Phys. t. xxxiii. p. 408; Archives des Découvertes, 1826, p. 193.
--- 0 ^h 40 ^m P.M.	Ditto	A more intense shock.	At the time of the shock the sea was observed to be in a state of great agitation near Sinigaglia, although the air was calm. The sand mixed with the water destroyed its transparency to the distance of two miles from the shore.	.....	Ditto.
--- 1 ^h 14 ^m P.M.	Ditto	A slight shock	.....	.....	Ditto.
--- 2 ^h 4 ^m P.M.	Ditto	Ditto	.....	v. Hoff gives the hour 4 ^h 2 ^m	Ditto.

	2.	3.	4.	5.	6.
Jan. 18 P.M.	Pesaro in the States of the Church.	A slight shock.			Ann. de Chim. et de Phys. t. xxviii. p. 408; Archives des Découvertes, 1826, p. 193.
— 19 A.M.	Ditto	Rather slight, from S.E. to N.W.			Ditto.
— 20 A.M.	Ditto	Ditto			Ditto.
— 21 A.M.	Ditto	Ditto, rather prolonged.			Ditto.
— 22 A.M.	Lunroe in Norway	Another shock.			Keilhan.
— 26 P.M.	Krensmunster in the circle of Traun, Austria. Also felt (at same time) at Vocklabruck, 4 miles further to the W. by S., and in the neighbourhood.	Some slight shocks. The first seemed to move in a north-westerly direction (from or to N.W.), and was rather horizontal. The other shocks seemed to be more vertical.		Principally felt in the upper stories of the houses. Boxes and furniture were shaken about. No change in the height of barometer or thermometer was observed. There was a light wind from the N.E., and the sky was clouded, but cleared up in the evening.	Preuss. Staatszeitung, 1826, No. 92. S. 367.
Pr. 3.	Admont in the circle of Judenburg in Styria.	A distinct shock.		The walls of the chapter-house rocked. The noise was very distinct. Wind westerly, with a clear atmosphere.	The Leonhard's Zeitschrift, 1826, B. ii. S. 536.
— 5 A.M. Maysa	Pesaro in the States of the Church.	Another slight shock, said to be from S.W. (S.E.?) to N.W.			Ann. de Chim. et de Phys. t. xxviii. p. 408; Archiv. des Découv. 1826, p. 193.
— 14 P.M.	Palermo St. Brioux in the department, Côtes du Nord, and the neighbourhood.	A shock A shock from E. to W., lasting 12 or 15 seconds.		Preceded by a noise like that of a carriage rolling over stones.	Poggendorff's Annalen, B. xiv. S. 54. Ann. de Chim. et de Phys. t. xxviii. p. 410; Pénissac, Bull. des Sc. Nat. t. viii. p. 329.
— 22 M.	Santiago in Chili	A severe shock			Garnier, Météorologie, p. 148.
— 23 M.	In Granada, Spain	A violent earthquake.		This account is said by v. Hoff to be doubtful.	Kefenstein's Geognostische Zeitung, St. 4. S. 112.
— 25 P.M.	Larvéc in Norway Jelissabethopol or Hamid, 158 versts from Tiflis in Georgia.	Another shock A severe vibratory shock, lasting 20 sec.		Accompanied by subterranean noise. No damage done.	Keilhan. Preuss. Staatszeitung, 1836, Nr. 199. S. 767.

1826 May 2. Island of Martinique ... 0 ^h 35 ^m A.M.	A shock of remarkably long duration, and severe enough to waken all who were asleep.	.....	.....	Revue Encycl. Juillet, p. 236.
— 15. Admont in the circle of Judenburg in Styria. Also on this day at Grätz, thirteen geographical miles to the S.E. of Admont.	A severe earthquake. The first strong shock was succeeded by oscillations which, at first rather violent, gradually became weaker. The earthquake seemed to come from the east, from the neighbourhood of Gäns, and extended to Rottenmann (two (German?) miles to the S.W.) and Gallenstein. At Grätz the shock was rather severe, and recurred eight times before the end of May. Several shocks. Others followed on this and the next day.	.....	Preceded by a low subterranean noise which constantly increased in distinctness. A loud noise like the explosion of a piece of heavy ordnance at a distance accompanied the first shock. Clocks were thrown down, and persons who were asleep were thrown out of their beds. The air was calm, and the sky overcast with thick clouds, which sank in large masses into the valley. The day before, the heavens had been clear, but in the evening a strong east wind blew at the level of the tops of the trees, though but little felt at the surface of the ground. At Grätz one of the shocks felt during this month was accompanied by a loud noise, and caused the people to leave their houses.	Leonhard's Zeitschrift. 1826, B. 2. S. 536; Geraische Zeitung, 1826, Nr. 93.
— 11 A.M.	Granada in Spain .....	.....	Preceded by loud subterranean noise. The other shocks of the 15th and 16th were unattended with noise. Rain, and cold wind.	Journ. des Débats, 5 Juin; Ann. de Chim. et de Phys. t. xxxiii. p. 410. Arch. des Découv. 1826, p. 193; Allgemeine Zeitung, 1826, Nr. 160. S. 638.
— 17. Ditto About dawn.	.....	.....	Accompanied by a terrible bellowing noise. Several buildings were more or less injured.	Ditto; Preuss. Staatszeitung, 1826, Nr. 141. S. 563.

2.	3.	4.	5.	6.
<p>17 20. Lunroe in Norway June, Granada in Spain the days on the P.M.</p>	<p>Another shock Some more slight shocks.</p>			<p>Keilbau. Journ. des Débats, 7 Août; Moni- teur, 2 et 8 Août; Ann. de Chim. et de Phys. t. xxxiii. p. 410; Arch. des Découv. 1826, p. 194. Preuss. Staatszeitung, 1826, Nr. 152. S. 006; Moniteur, 28 Juin.</p>
<p>4. Potenza in the Basilicata, Kingdom of Naples. Felt at the same time in the Campagna in Prin- cipato citiore; ten geographical miles to the west, and more slightly at Salerno, fourteen miles in the same direction.</p>	<p>Slight undulatory shock from N. to S., lasting about twelve seconds.</p>		<p>The places shaken on this occasion lay in the same line as those at which the earthquake of February 1 was felt.</p>	
<p>12. Smyrna. About this time severe shocks were also felt in the island of Metellino in the Archipelago.</p>	<p>An earthquake, last- ing thirty seconds.</p>			<p>Preuss. Staatszeitung, 1826, Nr. 208. S. 832; Leonhard's Zeitschrift, 1826, H. 2. S. 539; Ferrussac, Bull. des Sc. Nat. t. xi. p. 30.</p>
<p>17. Santa Fé de Bogotá in Columbia, S. America.</p>	<p>A violent earthquake. The first shock was followed twenty se- conds later by a se- cond, of greater vi- lence, lasting forty or forty-five sec- onds. The latter was in a horizontal direction from S. to N. M. Boussingault says that the first shock was in the direction and lasted eight se- conds, and that the second was at first from W. to E., and then changed to vi-</p>	<p>The second shock greatly injured many churches and other buildings, several of which fell on the following day. In a desert place, on the Cerro-Centro, one mile S.W. from the town, a cleft opened of 200 feet wide, from which there arose sulphurous vapours. The motion was so violent that M. Boussingault compares it to that of a boat on a stormy sea, and says that he with difficulty descended the stairs of his house during the second shock. The slight shock felt at midnight was accompanied by a dull noise coming from the east. This earth- quake, the most violent felt here since 1800, was preceded by long-continued drought, and immediately followed by very heavy rain. At the time of the shock the heavens were clouded and the air quite calm.</p>		<p>Moniteur, 1826, Nr. 246 et 254; Allgemeine Zeitung, 1826, Nr. 252, u. 260; Journal Columbus, B. II. S. 429; Archiv. des Découv. 1826, p. 194; Garnier, Météorologie, p. 149.</p>

1826. May 18. Potenza in the kingdom of Naples.	tion. About midnight another alight movement was perceived.			Prenss, Staatszeitung, 1826, Nr. 166. S. 663.
19. Santa Fé-de-Bogotá	A slight shock like that of the 4th, lasting ten seconds. Some slight shocks. M. Boussingault observed by means of his declination needle that the earth was still in a state of almost constant motion.			Moniteur, &c., as above.
20. Ditto 11 A.M.	Another very distinct shock. The motion was horizontal, from S. to N., and lasted some seconds.			Ditto.
21. Ditto At night.	Some more oscillations.			Ditto.
22. Ditto 4 ^h 45 ^m A.M.	Violent oscillations, horizontal and in the same direction as before, lasting 25 or 30 sec. From the 22nd to the 29th some more alight movements of the earth were perceived.	A part of the hospital was thrown down		Ditto.
23. Venice 1 ^h 30 ^m or 2 ^h 30 ^m P.M.	Two alight shocks			Allgemeine Zeitung, 1826, Nr. 192. S. 767; Journ. des Débats, 10 Juillet; Pérussac, Bull. des Sc. Nat. t. xii. p. 215, t. xv. p. 247.
Innsbruck 8 ^h 30 ^m P.M.				Ditto; Preuss, Staatszeitung, 1826, Nr. 158, S. 631, Nr. 164, S. 656, Nr. 166, S. 663; Gothaische Zeitung, Nr. 111 u. 116; Leonhard's Zeitschrift, 1826, B. ii. S. 478, 1827, B. i. S. 86.

2.	3.	4.	5.	6.
24. Innsbruck	A much stronger shock. The motion undulatory.		A accompanied by loud noise. Articles of furniture were rather violently thrown about.	Authorities quoted above (on the 23rd).
— Trento, Roveredo, Brixen, Mantua, places on the lake of Zurich, as at Wädenschwil, Stofa, and in the Seefeld near Zurich, and elsewhere in the Tyrol, the Switzerland, and Upper Italy.	At Trento the shock was undulatory, and lasted two seconds, in the direction E. to S. (?) At Roveredo the motion was slight, undulatory, from S.E. to N.W., and lasted fifteen seconds. At Brixen there were three shocks from S. to N., the third of which was the most violent. At Mantua, a slight earthquake of some seconds' duration.		At Trento accompanied by a gust of wind from the S., after which a gentle and somewhat cooler breeze blew up to 5 P.M. The sky was quite cloudless before the shock, but after it clouds gradually collected. The barometer fell at the moment of the shock 1.3 line, and went up again (in what time?) after it within 5 lines of its former height. At Brixen the weather had been windy for several days before, but during the shocks a perfect calm prevailed, after which the wind rose again, and warm weather followed. v. Hoff remarks that the places at which this earthquake was felt lie in a line running almost exactly N. and S., and concludes that the centre of disturbance lay between Brixen and Trento. The accounts vary considerably as to the hours at which the different shocks occurred. Probably those given for the 23rd at Venice and Innsbruck really occurred on the 24th, and perhaps 1 ^h 30 ^m or 2 ^h 30 ^m on that day is the correct time for all.	Ditto.
— St. Brioux in the department. Côtes du Nord.	One shock			Férussac, Bull. des Sc. Nat. t. xv. p. 247.
— Granada in Spain	Frequent slight shocks			Allgemeine Zeitung, 1826, No. 206. S. 822; Preuss. Staatszeitung, 1826, Nr. 187, S. 751; Moniteur, Nr. 220, p. 1156.
ly 4. Ditto	Two shocks			Journ. des Débats, 7 Août; Moniteur, 2 et 8 Août; Ann. de Chim. et de Phys. t. xlviii. p. 410.
16. Ditto	Three shocks			

—18. 40 ^m A.M.	Guadeloupe. Jamaica, in Mondego Bay.	A violent tempest soon after in the West Indian sea.	Some buildings were injured.....	Moniteur, 16 Oct.; Columbus, B. ii. S. 429.
—19. 30 ^m A.M.	Bender near Odessa, Russia.	A slight vibration, lasting 15 seconds.	.....	Journ. des Débats, 24 Oct.
—31. 1 A.M.	Nicastro in Calabria Ultra.	Two severe shocks .....	.....	Leonhard's Zeitschrift, 1827, B. i. S. 250.
—Sept. 1.	Monteleone, five geographical miles S. by W. from Nicastro.	A slight trembling .....	.....	Ditto.
—7.	Lunrøe in Norway	Another shock .....	.....	Keilhau.
—16. about 10 ^h 1 ^m A.M.	St. Jean de Boiseau in the department Loire-Inférieure.	Two slight shocks, from S.W. to N.W.(?).	.....	Journ. des Débats, 28 Sept.
—18. between 3 and 4 A.M.	St. Jago in Cuba. Also felt, though more slightly, at Kingston in Jamaica.	Three shocks, of which the second was the most severe. Each lasted nearly a minute.	Accompanied by loud noise, which at first resembled the rolling of a waggon over stones, and ended with an explosion as of a large number of heavy pieces of artillery. The weather was unbearably hot. Half the town of St. Jago was destroyed.	Allgemeine Zeitung, 1826, Nr. 339; Atlantis, by Rivinus, B. i. 1827, S. 68; Ann. de Chim. et de Phys. t. xxxiii. p. 412; Moniteur et Constitutionnel, 30 Nov.
—28. 30 ^m A.M.	Innsbruck in the Tyrol.	Violent undulatory shock.	Accompanied by noise like thunder	Leonhard's Zeitschrift, 1827, B. i. S. 250.
—.....	In the province of Otranto, Italy.	Several shocks during the month.	.....	Ann. de Chim. et de Phys. t. xxxiii. p. 408.
—Oct. 1.	Ofen, Pesth, Pilis, Monor, and Giömrö, in Hungary.	Violent shocks felt at the same time at these different places.	.....	Leonhard's Zeitschrift, 1827, B. i. S. 261.
—13.	Santiago in Chili.....	A severe shock .....	.....	Garnier, Météorologie, p. 151.
—.....	In the mountains of Praauw (Prahū?), in Java.	Severe shocks	Equal in intensity, though not in destructive effects, to the shock of the 19th of Nov. 1822. On the 11th the mountain Paköwodjo had burst. Similar phænomena took place in the mountains of Klut, but whether any eruption occurred is not mentioned.	Leonhard's Zeitschrift, 1827, B. i. S. 566.
—15.	Savannah in Georgia, United States.	A violent earthquake.	.....	Constitutionnel, 2 Déc.
		On the same day it blew a terrible gale of wind from the north, which forced many ships to put into harbour.	.....

2.	3.	4.	5.	6.
25. Atanzaro in Calabria Ultra, and Messina in Sicily	Several shocks			Journal de Savoie, 1826, 10 Nov. p. 1089.
26. Naples and in the province of Bari.	A shock, apparently in the direction N. E. to S. W.			Moniteur, 29 Nov.
27. Ischia in the province of Naples. And, about the same time, at Aquila in the Abruzzo Ulteriore.	Several shocks.			Ditto: Kastner's Archiv, B. xiv. S. 323.
29. Cosenza in Calabria Ultra.	Two severe shocks.			Moniteur, 29 Nov.; Kastner's Archiv, B. xiv. S. 103.
v. 5. Lunoe in Norway	Another slight shock.			Geogr. Zeitung, St. 4. S. 103.
26. Island of Arran, between Scotland and Ireland.	A shock of three or four seconds' duration		Accompanied by a rattling noise. The sky was clear, and there was but little wind at the time.	Edinburgh Journal of Science, vol. vi. p. 370.
27. Trente in the Tyrol	A vibration		This account v. Hoff considers doubtful	Kastner's Archiv, B. xiv. S. 244.
14. Granada in Spain	A violent shock. A few moments after, four slighter shocks were felt, and at 8 P.M. a very severe one.		Many persons were thrown out of their beds	Gothische Zeitung, 1827, Nr. 10; Moniteur, 10 Janv. 1827; Verzeichn. Bull. des Sc. Nat. Avril, 1828, p. 396.
15. At Innsbruck, in the whole valley of Montafon in the Tyrol, at Augsburg, Lindau, Coire, Winterthur, Schaffhausen, and Zürich. Also at St. Gall and Herisau. The limits of the earthquake seem to have been Zürich on the west, and Innsbruck on the east.	Shocks, more or less severe at the different places named		At Zürich the shock was not felt in every part of the town. Windows rattled, the pendulums of clocks were disturbed, and wainscot cracked.	Moniteur, 3 Janv. 1827; Allgemeine Zeitung, 1827, Nr. 1. S. 3; Gothische Zeitung, 1826, Nr. 206, 1827, Nr. 11.

1826. Dec. 16. 5 ^h 39 ^m P.M.	Innsbruck .....	.....	.....	Accompanied by noise like thunder	Leonhard's Zeitschrift, 1827, B. i. S. 341.
25. 2 P.M.	Ardvoirlich (Lough Erne) in Scotland, and at the same hour at Leadhills.	.....	.....	The sound which preceded the shock was like that of a blast in a quarry. The day was warm, thick, and hazy. On the 30th of this month a small river in East Gothland, Sweden, suddenly stopped at a particular place, so that it could be passed dryshod, but there seems nothing to prove that this was caused by any earthquake shock.	Kastner's Archiv, B. xiv. S. 192; D. Milner's Catalogue of British Earthquakes, <i>loc. cit.</i>
1827. Jan. 2. (Jan. 1 according to v. Hoff.) "à l'heure du dîner." At Essonne and Corbal, at 3 ^h 45 ^m P.M.	Montagne (department de l'Orne), Alençon, and neighbourhood. Also at Essonne and Corbeil in the department Seine-et-Oise.	.....	.....	Accompanied at Montagne and Alençon by a very loud noise. Chimneys were thrown down, and panes of glass broken. The sky was clouded, and the weather lowering and stormy.	Journ. des Débats, 12 Janv.; Constitutionnel, 10 Janv.; Ann. de Chim. et de Phys. t. xxxvi. p. 398.
14.	Near Wagstadt in Silesia.	.....	.....	After the shock a piece of land of about 3000 square klafters in extent sank seven feet. From the 14th to the 17th a tremendous storm raged over England, Holland, Germany, and Prussia.	Gothaische Zeitung, 1827, Nr. 35.
In middle of the month.	In Calcutta .....	.....	.....	An earthquake	Hamburg Corresp. 1827, Nr. 94.
...	In the Crimea .....	.....	.....	Ditto	Kastner's Archiv, B. xiv. S. 244.

2.	3.	4.	5.	6.
b. 9 In the island of Anglesea, and the north-west part of Wales. Also at Ripon in Yorkshire.	Lasted forty seconds to one minute.		Accompanied in Wales by a noise like that of a cart laden with stones. Furniture was overturned. At Ripon a tremendous explosion was heard, which shook the whole neighbourhood. A fissure was formed, nearly twenty yards wide, and twenty-four yards deep.	Phil. Mag. N. S. vol. iii. p. 463; D. Milne's Catalogue, loc. cit.; Ann. de Chim. et de Phys. t. xxxvi. p. 399.
- 11 El Zito in the Basilicata, kingdom of Naples.	A violent shock.			Kastner's Archiv, B. xiv. S. 324.
- 18 Aquila and Zeramo, kingdom of Naples.	Tremblings.		Unproductive of any damage.	Ditto, S. 326.
- 7 Luro in Norway.	Another shock.			Bull. de la Soc. Géol. t. vii. p. 21.
- 10 Leglor. Also felt at Sanguaglia.	time to time for eight successive days. Direction S.E. to W.			Kastner's Archiv, S. 326.
- 17 Palermo.	A shock.		On the 17th, 18th, 21st, and 22nd, there were violent and widely extended storms in various parts of Europe.	Poggendorff's Annalen, B. xxiv. S. 54.
- 18 Lunric in Norway.	Another shock.			Bull. de la Soc. Géol. t. vii. p. 21.
- 19 Palermo.	Another shock.			Poggendorff's Annalen, B. xxiv. S. 52.
- 1 Venice.	Three slight oscillations.			Allgemeine Zeitung, 1827, Nr. 107. S. 408.
- Appenzell; and at the same time in the Engadine, at St Gall, Trente, and Venice.	An earthquake consisting of three oscillations.		Probably the last account refers to the same event as that here recorded, or to the following.	Kastner's Archiv, B. xv. S. 140; Ann. de Chim. et de Phys. t. xxxvi. p. 399.
- 2 Bevers in the Upper Engadine.	Two successive shocks. This was the twentieth time that earthquake shocks had been felt at this place during the winter.			Ditto; Hamburg Correspond. 1827, Nr. 74; Phil. Mag. N. S. vol. iii. p. 463.
- 11 The islands of Ponza and Ischia, off the coast of Naples.	Violent vibratory shocks. The direction was from Ponza.			Forster's Notizen, Nr. 498 (B. xxiii. No. 12), according to Corvelli.

4 th A.M.	the Church.	lations.				
— 17.	Venice	A slight vibratory shock.				P. 408. Hamb. Corresp. 1827, No. 77.
— 18.	Trieste	Two shocks, lasting some seconds. Direction = N. to S.			More strongly felt in the houses on the sea-shore than in those more inland.	Gothaische Zeitung, 1827, Nr. 73.
0 th P.M.						
— 25.	Lunrøe in Norway	Another shock.				Bull. de la Soc. Géol. t. vii. p. 21.
day 2.	Trente in the Tyrol	A severe shock				Férussac, Bull. des Sc. Nat. t. xviii. p. 195.
9 th A.M.						
— 11.	Lunrøe in Norway	Another shock.				Bull. de la Soc. Géol. t. vii. p. 21.
— 13.	Ditto	Ditto				Ditto.
— 17.	Ditto	Ditto				Ditto.
— 18.	Ditto	Five shocks				Ditto.
— 27.	Ditto	Another slight shock.				Ditto.
— 28.	Ditto	Ditto				Ditto.
— 29.	Ditto	Ditto				Ditto.
—	Pajaca in Mexico	Two slight shocks				Ditto.
						Phil. Mag. N. S. vol. iii. p. 463; Constitutionnel, 6 Oct.; Ann. de Chim. et de Phys. t. xxxvi. p. 398 et t. xlii. p. 407.
— 30.	Lima in Peru	Violent shocks			The walls of the principal buildings were thrown down. Incalculable damage was done in the city.	Ann. de Chim. et Phys. t. xxxix. p. 406, t. xlii. p. 407.
2 nd A.M.						
—	Santiago in Chili	A rather slight earthquake.			Probably the same with the Peruvian earthquake.	Garnier, Météorologie, p. 152.
—						
— 2.	Lunrøe in Norway	Three shocks				Bull. de la Soc. Géol. t. vii. p. 21.
— 3.	In the Island of Martinique.	A slight vibratory shock.			At the same time the first rain fell after <i>sixty-six days'</i> drought; no such instance of dry weather in the <i>West Indies</i> was remembered.	Phil. Mag. N. S. vol. iii. p. 463; Hertha, B. x. S. 105, B. xii. S. 182.
—						
—	Lunrøe in Norway	Two more shocks				Bull. de la Soc. Géol. t. vii. p. 21.
—						
— 4.	Ditto	Another shock.				Ditto.
— 5.	Ditto	Ditto				Ditto.
— 6.	Ditto	Ditto				Ditto.
— 12.	Palermo	Several shocks, which lasted with short intervals for 18 minutes. The motion was constantly oscillatory.				Ann. de Chim. et de Phys. t. xxxvi. p. 399; Férussac, Bull. des Sc. Nat. t. xviii. p. 196.
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2.	3.	4.	5.	6.
e12 Tebucan in Mexico ... A.M.	A violent shock		Accompanied by terrible noise. Many buildings were injured.	Phil. Mag. N. S. vol. iii. p. 463; Constitutionnel, 6 Oct.
-16. Aquila in the kingdom of Naples.	A slight shock			Phil. Mag. N. S. vol. iii. p. 463.
-21. Palermo	Four severe shocks in seven seconds. The motion was oscillatory, and from W. to E.		No damage done.	Ditto; Poggendorff's Annalen, B. xxiv. S. 54.
-29. Ditto	Another shock			Poggendorff's Annalen, B. xxiv. S. 54.
-or The town of Tokat in the government of Sivas, Asia Minor.	An earthquake		A large part of the town was destroyed. The damage done extended also to the surrounding country.	The Gothaische Zeitung, 1827, Nr. 134; Kastner's Archiv, B. xiv. S. 216; Constitutionnel, 25 Août, Poggendorff's Annalen, B. xxiv. S. 54.
ly 5. Palermo	Another shock			Ann. de Chim. et de Phys. t. xlii. p. 407.
- Santiago in Chili...	A slight shock.			Hull. de la Soc. Géol. t. vii. p. 21.
- 7. Lunbe in Norway	Three shocks			Ditto.
- 8. Ditto	Another shock			Ditto.
- 11. Ditto	Ditto		July 11-13, violent storms at Stockholm, and over the Baltic to St. Petersburg. v. Hoff.	M. Perry gives the date July 24.
-21. Island of Martinique	A violent shock			Herrha, B. xii. S. 193.
P.M.	Two more severe shocks.			Monthly Magazine, April 1828, p. 429; Revue Encycl. Fév. 1828.
- 5. Ditto	A slight shock.			Columbus, Nov. 1827, S. 145.
A.M.	A slight shock.			Ditto.
- 6. New Albany, on the Ohio, in Floyd county, Indiana.	Another shock, more severe than the last.		A forge was thrown down, but otherwise no damage was done. This is said to have been the second earthquake of the year, but the date of the first is not given.	Ditto.
- 7. Ditto	The quick agitation of the earth, like an earthquake, lasted			

327. Aug. 14. Palermo 2 P.M.	one on the morning of the 9th. Several oscillatory shocks, which suc- ceeded each other at very short inter- vals for about eigh- teen minutes. An earthquake .....	.....	Phil. Mag. N. S. vol. iii. p. 463; Poggendorff's Annalen, B. xxiv. S. 54.
— — — 23. New London in Conne- cticut, United States. 10 P.M.	Accompanied by a noise like the rolling of a heavy waggon, the noise increasing for three or four seconds, and then decreasing for an equal time.	.....	Columbus, Dec: 1827, S. 197.
— Sept. 18. Lisbon	A slight shock.....	.....	Journ. des Débats, 8 Oct.; Ann. de Chim. et de Phys. t. xxxvi. p. 398.
— — — 25. Island of Martinique ... 5½ 30 ^m A.M.	Another shock .....	.....	Revue Encycl. 1828, Fév.; Hertha, B. xii. S. 182.
— — — Lunrøe in Norway	Two more shocks ...	.....	Bull. de la Soc. Géol. t. vii. p. 21.
— — — Ditto	Ditto .....	.....	Ditto.
— — — Fort Kolitaran near La- hore, Hindostan. Some day of this month before the 26th.	The fort was destroyed, and about a thousand persons perished beneath the ruins. A hill was shaken down, which falling into the river Rowée, produced an inundation of a hundred Coss of land.	.....	Madras Gazette, 26 Sept. 1827.
— Oct. 2. Island of Martinique ... 4 P.M.	Another shock.....	.....	Revue Encycl. 1828, Fév.; Hertha, B. xii. S. 182.
— — — 10. At Zürich, and all along the shore of the lake. 2½ 48 ^m P.M.	A rather severe shock .....	.....	Constitutionnel, 21 Oct.; Ann. de Chim. et de Phys. t. xxxvi. p. 398.
— — — 11. Ismail, Tutschkow, and Kischenew, in Bes- sarabia. 8 P.M.	Two slight shocks with a very short interval.	.....	Allgemeine Zeitung, 1827, Nr. 327. S. 1308.
— — — 14. Jassy in Moldavia 15. or 35 ^m P.M. 8½	Two rather violent shocks, with an in- terval of but a few seconds. The mo- tion was horizontal, from N. to S.	.....	Allgemeine Zeitung, 1827, Nr. 303. S. 1212; Phil. Mag. N. S. vol. iii. p. 463; Ann. de Chim. et de Phys. t. xxxvi. p. 398.

1.	2.	3.	4.	5.	6.
Oct. 20. Tides in Georgia. Also a severe shock. In-coming breeze, the phenomenon lasted more than forty minutes (?) Direction = S. E. to N. W. At Stavropol 4 shocks were felt, the first being the most severe. At Tiflis six more shocks were felt before the 23rd, and others at frequent intervals up to the 1st of February following.				Accompanied by a dull noise. The weather was calm, and the temperature $+17^{\circ}$ R. Some walls were cracked by one of the subsequent shocks. This earthquake was probably also felt, though slightly, at Erivan.	Ann. de Chim. et de Phys. t. xxxix. p. 406; Éreussac, Bull. des Sc. Nat. t. xiv. p. 44; Journ. des Débats, 9 Déc.; Moniteur, 13 Déc.
— 21. Lauries in Norway . . .		Another shock . . .			Ball. de la Soc. Géol. t. vii. p. 21.
— 23. Ditto . . .		Ditto . . .			Ditto.
— 25. Ditto . . .		Ditto . . .			Ditto.
— 30. In the Cantons of Tavare, Talano, and Sartene in Corsica.		Two shocks . . .			Constitutionnel, 27 Nov.; Ann. de Chim. et de Phys. t. xxxvi. p. 398.
Nov. 16. In Columbia, S. America, on a line from N. E. to S. W., from Sta Fé-di-Bogota to Pasto, and thus parallel to the chain of the Andes. Whether felt to the east of the Andes or not, is not to be learned from the accounts.		A violent and widely-extended earthquake. The first shock came very suddenly, and was followed by an undulatory movement of the ground, lasting forty or fifty seconds, after which there came again a short violent shock. In Popayan the undulatory motion lasted three or four minutes, the direc-		This earthquake was more destructive than the more violent one of 1826, from its duration and the character of the motion. In Bogota, Neiva, Popayan, Parace, and in fact all the towns and villages shaken, the damage was terrible, the houses crumbling into ruins everywhere. The destruction was greatly increased by the overthrow of several of the rivers, as the Magdalena, Cauca, &c., partly caused by heavy rain at this time, and partly by the falling in of banks and the hills overhanging the rivers. Great clefts opened in the ground in some places, into one of which the river Tunza flowed. Violent detonations followed the shock, occurring at intervals of thirty seconds with weak shocks.	Moniteur, 1828, No. 44, p. 71, No. 71, p. 293; Éreussac, Bull. des Sc. Nat. t. xvii. p. 356; Ann. de Chim. et de Phys. t. xxxix. p. 406, t. lii.; Phil. Mag. N. S. vol. iv. p. 56; Allgemeine Zeitung, 1828, Nr. 58, S. 229, quoting the Journal of Bogota, El Constitucional.

Date and Time	Location	Description of Event	Authorities quoted above for the 16th.
1827. Nov. 17. 9 A.M.	Ochozk on the eastern coast of Siberia.	tion being S.E. to N.W. At this place the earth seemed much disturbed during the whole of the 16th and following night, and shocks of more or less severity were felt every forty or fifty minutes, up to 5 A.M. on the 17th.	This account is rendered very remarkable by its showing the earthquake in Siberia to have been almost exactly at the same time as that in S. America, and therefore making it probable that the same shock was propagated to the enormous distance between S ^a Fé and Ochozk.
6 P.M. of the 16th, at S ^a Fé-di-Bogota, would correspond to 8 ^h 40 ^m A.M. on the 17th at Ochozk).	At Popayan, in the same district of Columbia, shaken on the 16th.	A shock of still greater severity than that felt at this place the evening before, followed by an oscillation or shaking motion of considerable duration.	A great part of the town was ruined.....
5 A.M.	Ditto	The shocks again became very violent.	Ditto.
11 ^h 45 ^m A.M.	Ditto	Another shock.....	Ditto
5 P.M.	Ditto	According to some accounts this was the last shock here felt, according to others the motion of the earth continued up to the 21st.	On the 21st an eruption of the volcano of Parace began. Thick clouds of vapour are said to have been seen before and on the day of the earthquake, on the old volcano of Tocaina and on the mountains of Santa Anna in Marequito and Parama de Ruiz.
4 ^h 30 ^m A.M.	18.		Ditto.

1.	2.	3.	4.	5.	6.
1827, Nov 21. In the valley of Lau- 8 A.M. terbrunn, Canton of Berné.		A severe earthquake.			Kastner's Archiv, B. xiv. S. 234.
— 22 Lounce in Norway		Another shock.			Bull. de la Soc. Géol. t. vii. p. 21.
— 24 Ditto		Ditto			Ditto.
— 29 Ditto		Ditto			Ditto.
— 30 Islands of Martinique, Gadeloupe, Marie Galante, Antigua, and 3 A.M. St. Domingo also said to have been felt in Terra Firma, South America.		A violent shock of thirty or forty se- conds duration. Di- rection E. to W., or according to others, S. to N. In Mar- tinique it was ver- tical, and the most severe shock there remembered. This is said to have been the tenth earth- quake in the West Indies within six months.	Also felt at sea, 100 leagues to the W. of Martinique, on board the ship 'Le Martiniquois,' in a place where shoals are marked on the charts. All the ves- sels near Pointe à Petre, and in the roadsteads of St. Pierre and Fort Royal, also expe- rienced the shock.	Preceded in some places, as in Guadeloupe, by a violent squall of wind. In Martinique build- ings were thrown down.	43. p. 169, No. 57. p. 238; Ann. de Chim. et de Phys. t. xxxvi. p. 398; Phil. Mag. N.S. vol. in. p. 463; Hertha, B. xii. S. 183.
— Dec. 1. Island of Martinique		Another shock, ac- companied by un- dulatory motion.			Hertha, B. xii. S. 183, quoting Revue Encycl.
— 10 A.M.		Ditto			Ditto.
— 3 ^h 15 ^m P.M.		Shocks.			Kastner's Archiv, B. xiv. S. 234.
— 3. In Sweden		Another shock, ac- companied as be- fore on December 1, by undulatory mo- tion.		Immediately followed, as had been some of the other shocks of the few days preceding, by rain. On the 9th a remarkable volcanic erup- tion, accompanied by shocks of considerable violence but small extent, took place near the village of Joknali in the province of Bakon on the Caspian Sea. Vide v. Hoff.	Hertha, B. xii. S. 183, quoting Revue Encycl.
— 3 ^h 20 ^m A.M.					
— 13. Lisbon		The shocks were from W. to E. The one at 3 ^h 30 ^m was fol- lowed, six seconds later, by two more		Church bells were made to toll, and the walls of the houses cracked. Dogs howled before the shocks. In the afternoon of the same day an extraordinary rain fell on the city of Lisbon.	Moniteur, 13 Fév. 1828; Pérussac, Bull. des Sc. Nat. t. xviii. p. 342; Poggendorf's Annalen, B. xix. S. 460.
— 3 ^h 30 ^m 4 ^h A.M.					

1827. Dec. Night between 21 and 22. (Probably at 2 and 3 A.M. on the 22nd.)	Friburg, Berne, &c. on the Upper Rhine.	vibrations.	.....	Saxony. A similar phenomenon had been there remarked on the 1st of November, 1755, the day of the great earthquake of Lisbon.	Communication of M. Studer to M. Perrey; Kastner's Archiv, B. xiv. S. 234.
— (Four years after the eruption of Austur-Jökull in 1823.)	In the neighbourhood of the volcano Austur- Jökull in Iceland.	An earthquake .....	.....	.....	Voyage en Islande, partie Géol. p. 214.
1828. Jan. 3. After noon.	Aquila in the Abruzzo, kingdom of Naples.	Two shocks from S.E. to N.W.	.....	.....	Kastner's Archiv, B. xiv. S. 236.
— — — — — 12.	Lunrøe in Norway	Another shock .....	.....	.....	Keilhau.
— — — — — 12.	Near Hohen-Memmin- gen, about half a mile E.N.E. from Giengen, in Swabia.	A slight vibratory shock from N.W. to S.E.	.....	The weather was unsettled. The thermometer stood before noon at +5°, after noon at +6°.7 R. During the following night a vio- lent storm raged in the Channel and on the S. and E. coasts of England, felt later at Nu- remberg and in Thuringia.	Schweigger's Jahrb. t. xxix. (lix.) S. 34; Correspondenzblatt d. Wür- temb. Landwirths. Vereins. Sept. 1829. S. 170.
— — — — — 14. 11 ^h 45 ^m P.M.	Venice	Slight undulatory shock from S. to N.E. (?), lasting 2 seconds.	.....	After the motion had ceased a prolonged dull noise was heard in the air. The weather was dark and stormy. Walls were cracked.	Kastner's Archiv, B. xiii. S. 71; Ann. de Chim. et de Phys. t. xxxix. p. 408; Journ. des Débats, 26 Janv.
— — — — — 16.	Gross Kostely in the county of Krassova, Hungary.	An earthquake .....	.....	Preceded by a severe thunderstorm, lasting an hour and a half.	Leonhard's Zeitschrift, 1828, S. 651.
— — — — — 29. 10 ^h 15 ^m A.M.	Ohnastetten in the baili- wick of Urach, 2700 feet above the level of the sea, and Unter- hausen in the adjoin- ing valley of Honau,	A pretty smart shock from W. to E., last- ing about 2 secs.	.....	Accompanied by a heavy subterranean noise, like a distant cannonade. Windows rattled, un- fastened sashes swung to, articles of furniture were moved from their places, &c. The baro- meter at Ohnastetten fell about 3 lines soon after the shock. At Tübingen it was 4 lines	Schweigger's Jahrb. t. xxix. (liv.) S. 34; Corresp. d. Würtemb. Land- wirths. Vereins. Sept. 1829. S. 170, 171.

1.	2.	3.	4.	5.	6.
1828, Feb. 2 16 ^h 13 ^m A.M.	near Tübingen, Swabia	One of the most violent of undernearth- quakes, though confined to but a limited district. Slight movements had been felt at 3 A.M. at Forth, Faenza, and Imola, in the States of the Church, and at Fog- gio, San Severo, Bar- letta Bani, and some other places in the kingdom of Naples. In the last-named place the motion was from E. to W., and began about 7 A.M. The earthquake in Ischia consisted of an undulatory shak- ing motion, lasting 4 sec.	The sea was quite calm, and remained so all day.	above the mean height, and fell 2 lines before the following morning, the weather remaining calm and clear. Proceeded by no remarkable phenomenon, except that in the morning Vesuvius sent forth smoke, and afterwards flame and stones. The springs exhibited no change, except that of Rita, the temperature of which was slightly altered. Im- mediately before the shock, in the space of 3 sec., three loud explosions were heard, which appeared to come from beneath upwards, or from the interior of the Epomeo outwards. These explosions were very remarkable along the coasts of Casamicciola, Lacco, and Forio, but in the interior of the island, where the shock was most severe, they were scarcely re- marked. The part of the island which suffered most lies west of Casamicciola, between Fango and Casamenello, the shock apparently pass- ing from the Epomeo thither. In Casamicciola a part of the buildings fell together to the ground, and twenty-eight men were killed and many injured. In Serrafontana, Porto, and Testaccio no damage was done, but Lacco suf- fered remarkably. The barometer had been higher in the middle of January than for six years before.	Allgemeine Zeitung, 1828, Nr. 61; S. 243; Cuvell in the Journal II Pontano, Nr. 2; Biblioth. Um- vers. Oct. 1828, p. 157; Kastner's Archiv, B. xiv. S. 327.
4. Tamasco, about 200 miles E.S.E. of Vera Cruz, Mexico.		A violent earthquake.		The roofs of the churches and the prison were destroyed, and the bank of the river Tabasco sank 30 feet. Villa Hermosa, a town 7 miles higher up the river, was almost entirely re- duced to a heap of ruins.	Columbus by Rdding, B. II. S. 140.
6. Luvåre in Norway		Another shock			Keilhan.
8. Again in the district of the Swabian Alps, shaken on the 29th January hut over a		Another shock, of greater violence than that of Jan. 29. It lasted 8 sec. & more		During a profound calm. Subterranean noise accompanied the shock. The houses were strongly shaken, tables, chairs, &c. were	Keilhan. Subterranean noise Schweigger's Jahrb. t. xlix. (lx.) S. 35; Corresp. d. Würtemb. Landwirthsch. Verbin. Sept. 1829.

1828. Feb. 13. Lunnœ in Norway	Another shock .....	.....	earth was sinking under them. In Tübingen the motion was very distinctly felt in many parts of the town. The barometer at that place stood at about the mean height, and fell on the day of the earthquake and the following 3 lines, but no storm or rain ensued. Herr Schübler remarks, that both this shock and that of the 29th January proceeded from the same chain of mountains, which in this district is often intersected by basaltic formations.	Keilhau.
— 14. Island of Ischia	Another severe shock.	.....	Some buildings on the plains of Casamicciola were ruined.	Authorities quoted under Feb. 2.
— A Manilla in Luçon, Philippine Isles.	Several slight shocks.	.....	The eruption of the volcano of Albay, which began in June 1827, still continued.	DerFreimüthige, 1829, Nr.54. S.216.
— About 8 ^h 20 ^m A.M.	An earthquake, more remarkable for the extent of the district shaken than for its intensity. At Liège several shocks were felt, at first very slight, but afterwards rather severe, lasting 7 to 8 secs., apparently in the direction S.E. to N.W. Here and at Maestricht slight motion was said to have been felt about 2 A.M. At Tirlemont the shocks lasted 7 minutes (seconds?). At Commercy there were two shocks from S. to N. At Longuyon but one, rather severe, and lasting more than a	.....	At Liège the weather was quite calm. The shocks there felt were accompanied by a dull noise. The houses shook, and articles of furniture exhibited a very marked oscillatory motion. Some chimnies were thrown down. The motion was most felt in the upper stories of the houses. It was also felt in the coal-pits, in one of which a rolling noise was said to have been heard. The barometer remained as before the shocks, at 27 inches 1 line. At Maestricht, Tirlemont, Dunkirk, &c. chimnies were thrown down, walls cracked, glass and china broken, and furniture moved about. Some magnetic perturbations are said to have preceded or accompanied the earthquake. Thus at Cologne, on the 23rd, a variation of four degrees to the west was observed. On the 21st the barometer was unusually low at Geneva, Coburg, and other places; and on the 19th, 20th, 21st, 22nd, and 23rd, terrible storms raged over the centre of Europe. The earthquake was felt at almost all the places included within the limits given in column 1, as Mons, Namur, Louvain, Aix-la-Chapelle, Hainaut, Dusseldorf, Cologne, Bonn, Rema-	Journ. des Débats, 1 et 28 Mars; Constitutionnel of same dates; Moniteur, 27 et 28 Fév., 1 et 28 Mars; Ann. de Chim. et de Phys. t. xxxix. p. 408; Férussac, Bull. des Sc. Nat. Mars 1829, Mai 1830; Allgemeine Zeitung, 1828, Nr. 65. S. 260; Phil. Mag. N. S. vol. iv. p. 55; Kastner's Archiv, B. xiii. S. 384; Hertha, 1828, Sept. 12. iii. 78; Poggenдорff's Annalen, B. xii. (lxxxviii.) S. 331, xiii. (lxxxix.) S. 153; Schweigger's Jahrbuch, B. xxiii. (lii.) S. 1.

2.	3.	4.	5.	6.
ab. 24. Washington and Baltimore in the United States.	minute. At 4 1/2 the shock was from E. to W., equally strong, but of short duration. At Dunkirk the direction of the motion was variously reported, it was most generally given as S. to N. At Brussels the shock was exceedingly slight, though situated near the centre of the disturbed district.		gen, Coblenz, &c. &c. For a long account of this earthquake vide v. Hoff's 'Chronik.'	
— 26. Upbergen and Beck near more in the United States.	A violent shock		v. Hoff remarks that, although the hour at which this shock was felt is not given, if the day be correctly recorded the present shock cannot have been simultaneous with that in Belgium.	Hertha, B. xii. S. 100.
ar. 1. Lunroe in Norway	A slight shock from S. to N., lasting 2 secs.		In all probability this is but an account of the shock of the 23rd. mistaken as to day. Nöggerath believes this to be the case.	Arahelmer Zeitung, 27 Feb.
— 3. Ditto	Another shock			Kellhan.
— 4. Ditto	Ditto, severe			Ditto.
— 5. Ditto	Two shocks Some other very feeble shocks.			Ditto.
— 6. In the West Indies (which inland or islands?).	A slight shock from E. to W.			Ann. de Chim. et de Phys. t. xxix. p. 410.
— 9. Washington and some of the neighbouring towns.	Two severe shocks, lasting together not quite 30 secs. The first was stronger than the second.		Accompanied by a noise like the rolling of heavy waggons over pavement. People were awakened by the shocks and sprang out of bed.	Monthly Magazine, 1828, August, p. 202; Ann. de Chim. et de Phys. t. xxix, p. 410.

ing days.					
— 22. — 0 ^h 20 or 30 ^m A.M.	Jauche, Jandrin, Jandre- nouville, and more slightly at Louvain, in Belgium.	A shock of 3 seconds' duration.	.....	Possibly nothing more than an account of the event of Feb. 23, wrongly given as to date.	Chim. et de Phys. t. xxxix. S. 424, &c. Schweigger's Jahrbuch, xxiii. (liii.) S. 45.
— — — About 2 A.M.	On the Dürrenberg, near Strehla on the Elbe, and the neighbour- hood.	A remarkable shock...	.....	Accompanied by rolling noise. The evening be- fore, a warm wind blew from the south, with thunder-clouds and heavy rain. At the time of the shock there was a storm, and though thunder-clouds were to be seen in the north, in the zenith the sky was clear. On the 21st a large landslip took place on Mont Cerisier, near Audenaarden in Belgium, by some con- sidered as a consequence of the late earth- quake in that country. Moniteur, 1828, no. 93. p. 394; Schweigger's Jahrbuch, B. xxiii. (liii.) S. 49.	Ditto, quoting Berliner Vossischen Zeit. Mith. d. Statist. Vereinsina Königreich Sachsen. Lief. xi. p. 42.
— 23. — About 9 ^h 30 ^m A.M.	Le Quesnoy and Jauche in Belgium.	A severe shock, from beneath upwards.	.....	Unaccompanied by noise. <i>Possibly</i> but the same with the event of Feb. 23, wrongly reported as to date.	Moniteur et Constitutionnel, 27 et 28 Mars; Ann. de Chim. et de Phys. t. xxxix. p. 410. Morgenblatt, 1828, Nr. 253. S. 1012.
— 29. — 4 ^h 30 ^m A.M.	Island of Martinique ...	A prolonged vibration from E. to W.	.....	.....	.....
— 30. — 7 ^h 32 ^m A.M., at Lima, at Callao a few moments la- ter.	In Peru. Extended but a short distance south of Lima and Callao. It was felt at Are- quipa, but not at all at Arica. To the north, however, it was perceived at Surras, Huanaco, and even Truxillo.	A very violent earth- quake, probably passing from the chain of the Andes out to sea. In Lima the shocks lasted according to some 29, according to others 40 seconds. In Callao they re- curred during 3 min. At 49 min. after midnight an- other shock, but of short duration, oc-	Some of the phænomena- na observed on board a ship in the har- bour of Callao were very remarkable. On board the 'Vo- lant,' about half- past seven, a noise like distant thun- der was heard, and then came a shock, compared to jolt- ing over a rough road in an ill-con- structed cart, or to	Great damage was done. Scarcely a house in Lima or Callao remained uninjured, and walls of 6 and even 9 feet thick were thrown down. The cloud of dust which arose from the ruined buildings of Lima was seen at Callao before the shock itself was felt there. At Surras streams of water burst forth from the earth. At Truxillo and elsewhere in the northern part of the district shaken, the most extraordinary and violent rain followed, lasted four days, and produced most disastrous inundations. On board the ship 'Volant' the shock is said to have been felt <i>before</i> it was perceived on shore, while the accounts from other vessels agree in saying that the earthquake was first felt on the land.	Moniteur, 1828, no. 254. p. 1435; Galignani's Messenger, 30 Aug.; Allgemeine Zeitung, 1828, Nrs. 224, 237 u. 250; Ann. de Chim. et de Phys. t. xlii. p. 416, quoting the Globe; Morgenblatt, 1829, Nr. 238; Férussac, Bull. des Sc. Nat. t. xvii. p. 354.

2.	3.	4.	5.	6.
<p>carried, and during the six following days others were felt.</p>	<p>the vessel striking upon rocks or sandbanks. The water, which was 25 fathoms deep, hissed and boiled as if red-hot iron had been thrown into it, and the surface was covered with bubbles of gas of a sulphurous odour, and quantities of dead fish. The sea had been quite clear, but was now disturbed and muddy. The ship swung to the extent of 14 in. on either side. On weighing anchor, the chain cable of one of the anchors was found to be half melted in a considerable part of its length, the links being drawn out also lengthways. The chain of the second anchor was quite uninjured, as were those of all the other ships in the bay.</p>	<p>the vessel striking upon rocks or sandbanks. The water, which was 25 fathoms deep, hissed and boiled as if red-hot iron had been thrown into it, and the surface was covered with bubbles of gas of a sulphurous odour, and quantities of dead fish. The sea had been quite clear, but was now disturbed and muddy. The ship swung to the extent of 14 in. on either side. On weighing anchor, the chain cable of one of the anchors was found to be half melted in a considerable part of its length, the links being drawn out also lengthways. The chain of the second anchor was quite uninjured, as were those of all the other ships in the bay.</p>	<p>the vessel striking upon rocks or sandbanks. The water, which was 25 fathoms deep, hissed and boiled as if red-hot iron had been thrown into it, and the surface was covered with bubbles of gas of a sulphurous odour, and quantities of dead fish. The sea had been quite clear, but was now disturbed and muddy. The ship swung to the extent of 14 in. on either side. On weighing anchor, the chain cable of one of the anchors was found to be half melted in a considerable part of its length, the links being drawn out also lengthways. The chain of the second anchor was quite uninjured, as were those of all the other ships in the bay.</p>	<p>the vessel striking upon rocks or sandbanks. The water, which was 25 fathoms deep, hissed and boiled as if red-hot iron had been thrown into it, and the surface was covered with bubbles of gas of a sulphurous odour, and quantities of dead fish. The sea had been quite clear, but was now disturbed and muddy. The ship swung to the extent of 14 in. on either side. On weighing anchor, the chain cable of one of the anchors was found to be half melted in a considerable part of its length, the links being drawn out also lengthways. The chain of the second anchor was quite uninjured, as were those of all the other ships in the bay.</p>
<p>port 4. Santiago in Chili</p>	<p>A severe vibratory shock.</p>	<p>For in the States of the Eighteen shocks at the 10. Overboard, and more so.</p>	<p>For in the States of the Eighteen shocks at the 10. Overboard, and more so.</p>	<p>Ann. de Chim. et de Phys. t. xiii. p. 487. Constitutionnel, 29 Avril; Ann. de</p>

1828. April. Night between 10 and 11.	verely at Meldola and Galeata. Also felt at Ancona, Pesaro, and Sinigaglia. Rome	A slight undulatory shock. It was very severe at Pesaro.	.....	.....	Pérussac, Bull. des Sc. Nat. t. xviii. pp. 196 et 342; Schweigger's Jahrb. B. xxiii. (liii.) S. 52 u. 53; Allgem. Zeitung, 1828, Beil, 112. S. 447. Ditto.
— 11. At Florence, 11 ^h 20 ^m P.M.; at Venice, 11 ^h 22 ^m ; at Zara, 11 ^h 30 ^m .	Florence, Bologna, Ve- nice, Zara, and Trieste.	At Florence an undu- latory shock, last- ing 20 or 22 sec. The motion was at first from E. to W., then from S. to N., and then again from E. to W. At Venice a second shock was felt somewhat later. At Zara also there were two shocks, of which the se- cond was the most violent.	.....	At Florence the sky was clear; the western ho- rizon alone was covered with a slight mist. At Zara loud subterranean noises were heard. At Venice, about 3 A.M. in the same night, a violent thunder-storm burst forth.	Ditto.
— Night between 12 and 13.	Berlin	Shocks .....	.....	"This account is at least doubtful."—Poggen- dorff.	Schweigger's Jahrbuch, B. xxiii. (liii.) S. 53.
— May 10. 6 ^h 15 ^m A.M.	Santiago in Chili	A severe vibratory shock.	.....	.....	Ann. de Chim. et de Phys. t. xlii. p. 407.
— 13. 10 ^h 30 ^m A.M.	Büren and Limbach, in the canton of Berne, Switzerland.	Severe shocks .....	.....	The Constitutionnel of the 28th May gives the hour as half an hour after midnight.	Ditto, t. xxxix. p. 411.; Mérian.
— 20.	In the south of Scotland, felt near Dumfries.	An earthquake .....	.....	Felt in the mines of Wanlock-head	D. Milne's Catalogue of British Earthquakes, loc. cit.
— 21. 8 P.M.	Santiago in Chili	A slight vibratory shock.	.....	.....	Ann. de Chim. et de Phys. t. xlii. p. 407.
— 22. Midnight.	Soleure in Switzerland ..	.....	.....	.....	P. Mérian.
— 23. 3 P.M.	Santiago in Chili	Another slight vibra- tion.	.....	.....	Ann. de Chim. et de Phys. t. xlii. p. 407.
— June 15. 5 A.M.	Smyrna	Two shocks, with scarcely any inter- val; of which t e	.....	Many houses were injured	Ditto, t. xxxix. p. 411; Constitu- tionnel, 8 Août.

2.	3.	4.	b.	6.
June 15. Messina in Sicily.....	first was vertical, and lasted 2 secs., the second horizontal, from N. to S.	.....	About the end of the month there was an eruption of gas or vapour in the island of Isthia.	Bibl. Univ. Mai 1831, p. 85.
July 18. Poliere in the department of Vienne.....	An unobscured shock.	.....	.....	Journ. des Débats, 27 Juin; Ann. de Chim. et de Phys. t. xxix. p. 411.
July 4. Sanlepp in Chiff.....	A slight shock.	.....	.....	Ann. de Chim. et de Phys. t. xlii. p. 407.
July 4. Sanlepp in Chiff.....	A severe shock.	.....	.....	Forriep's Notizen, B. xxii. Nr. 7. (469.) S. 106.
July 20. Bhud in the East Indies (in Hindostan?).....	A violent shock from E. to W.	.....	Water was thrown out of glasses which were half-full. The sky was clouded, and in the afternoon it rained heavily.	Ann. des Voyages, 1829, Mai, p. 248, quoting the Asiatic Journ.; Leonhard u. Bronn, N. Jahrbuch, 1833, S. 125.
July 21. Alt-Schamachi in the Caucasus, 80 or 90 wersta from Baka, at which place the shocks were not felt.	An earthquake. Five shocks were felt in three days.	.....	.....	Authorities quoted below for this place, under August.
July 26. Coire in the Gisons, Switzerland.....	.....	.....	.....	.....
July 29. Island of Murtinique.....	.....	.....	.....	Communication of M. Studer to M. Perrey.
Aug. 6. Schouscha in Georgia.....	Several shocks, continuing until morning. Three more shocks were felt during the day, and two others before 1 o'clock the following night.	.....	Forriep's 'Notizen,' here quoted, mentions a disastrous earthquake at Lima on the 30th July, but doubtless it refers to the 30th March. Preceded by continuous rain and violent wind.	Forriep's Notizen, B. xxii. Nr. 7. (469.) S. 106.
Aug. 12. Kouba, in the same district of the Caucasus.....	Two rather severe shocks, followed by	.....	.....	Journ. des Débats, 15 et 21 Oct.; Moniteur, 30 Oct.; Pétusac, Bull. des Sc. Nat. t. xvii. p. 352, t. xxv. p. 31; Ann. de Chim. et de Phys. t. xxxix. p. 411, t. xlii. p. 417; Galvani's Messenger, Oct. 21; Allgemeine Zeitung.

out all the provinces of the Ottoman empire.	10. Santiago in Chili	Another severe shock.	.....	ing villages great numbers of buildings were utterly ruined, and others more or less injured. The village of Mongalou was buried beneath a great landslip (brought down by the earthquake). Three large springs burst forth where the soil had been torn away from the surface of the mountain. After the earthquake the streams are said to have been more or less swollen. Half of the village of Ischagana was swallowed up by the earth. In several places fissures and new springs made their appearance. At the village of Sahiany a fissure was observed of nearly 3 feet in width and 2½ wersts long. During the night a light appeared above it like lightning.	Ann. de Chim. et de Phys. t. xlii. p. 407. Kastner's Archiv, B. xiv. S. 392.
Between 1½ 30 ^m and 2 A.M.	13. In Belgium. Felt at Brussels, but no other places mentioned.	Two alight shocks .....	.....	Accompanied by remarkable subterranean noise.	Ann. de Chim. et de Phys. t. xlii. p. 407.
14. In the morning.	Santiago in Chili.....	Another severe vibratory shock.	.....	.....	Ann. de Chim. et de Phys. t. xlii. p. 407.
Between noon and 1 P.M.	Again at Schouacha in Georgia.	Two more shocks. Six of those felt at this place were very severe, and lasted a minute each.	.....	Some walls were thrown down at this place ...	Ditto, t. xxxix. p. 411, and other authorities quoted above.
20. St. Paul de la Valtrie in Canada.	St. Paul de la Valtrie in Canada.	A shock .....	.....	Accompanied by subterranean noise.....	Corresp. d. Würtemb. Landw. Vereins. 2 Hef, 1829, S. 115.
25. Santiago in Chili.....	Santiago in Chili.....	Another severe vibratory shock.	.....	.....	Ann. de Chim. et de Phys. t. xlii. p. 407.
Sept. 10. Palermo	Palermo	A shock .....	.....	.....	Poggendorff's Annalen, B. xxiv. S. 54.
13. In the kingdom of Murcia, Spain.	In the kingdom of Murcia, Spain.	The first shock of the earthquake of the 15th.	.....	.....	Moniteur, 20 Oct.; Journ. des Débats, 5 Oct.; Constitutionnel, 9 Oct.; Férussac, Bull. des Sc. Nat.

1.	2.	3.	4.	5.	6.
1828, Sept. Night between 14 and 15. 5 ^h 16 ^m A.M. The most violent shock at 5 P.M.	Morca and some other towns in that pro- vince, and in Valencia. Ditto. The principal centre of disturbance appeared to be on the coast, and beneath the villages of Torrevieja and Guardamar.	A violent shock The earthquake took the direction N.W. to S.E. At 6 ^h 15 ^m it recommenced with less violence, and again recurred at 3 ^h 30 ^m the fol- lowing night. The principal shock at 5 P.M. was follow- ed by 300 others within twenty-four hours, and frequent oscillations were experienced still later, which kept the inhabitants in a constant state of alarm up to March 1829. At Torre- vieja and Guarda- mar eleven violent shocks were felt on this day.	.....	Some damage was done, especially at Lorca, Ori- huela, and Torrevieja. At Torrevieja, Guardamar, and La Mata many houses were thrown down and others injured. The water in some of the wells overflowed, while in others it disappeared. In some places loud subterranean noises were heard. On the 14th there had been an extraordinary storm in Catalonia, accompanied by hail of most un- usual size.	t. xviii. p. 201; Ann. de Chim. et de Phys. t. xxxix. p. 411, t. xlv. p. 396, &c. Ditto.
18. Calcutta 7 A.M.	.....	Two severe shocks. The motion was in a vertical direc- tion.	.....	Articles of furniture were thrown up into the air. The atmosphere was quite calm, but heavy and thick.	Asiatic Journal; Ann. de Chim. et de Phys. t. xlii. p. 347; Ann. des Voyages, 1829, Mai, p. 247.
23. Santiago in Chili 10 ^m P.M.	.....	A rather severe shock.	.....	.....	Ann. de Chim. et de Phys. t. xlii. p. 407.
24. Pasmisdola to ..... .....	.....	A rather severe shock.	.....	.....	.....

1828. Oct. 1. In the morning.	1. Island of Gran-Canaria, Canary Isles.	A violent earthquake.	Felt on board vessels in harbour as if they had touched the bottom.	Many buildings were greatly injured	.....	Moniteur, 20 Déc.; Ann. de Chim. et de Phys. t. xxxix. p. 411; Ferrussac, Bull. des Sc. Nat. t. xvii. p. 353.
— 5. 11 ^h 40 ^m A.M.	5. Cesena in the States of the Church.	A slight shock.	.....	.....	.....	Ann. de Chim. et de Phys. t. xxxix. p. 411.
— 8. 10 ^h 44 ^m and 11 ^h 45 ^m P.M.	8. Pesaro in the States of the Church. Also slightly at Genoa.	Slight shocks. The same night(?) slight shocks were also felt at Verona, Lucca, Florence, Novi, and Pignerol.	.....	.....	.....	Ditto, p. 412.
(v. Hoff gives the hours 10 ^h 45 ^m and 11 ^h 25 ^m). At Genoa, about 10 P.M.	9. Genoa and Turin. Also felt at Port St. Maurice, Alessandria, Voghera, and even at Marseilles. On this day, and probably at the same time, a shock was felt at Urseren on the St. Gothard.	At Genoa and Turin a violent oscillatory shock, lasting at Genoa 20 seconds, at Turin 30. At Genoa another shock about 8 ^h 30 ^m A.M.	In the harbour of Genoa very considerable motion of the sea was produced, so that vessels struck against each other.	In Genoa small bells were set in motion, and clocks stopped. Some buildings were injured by great cracks, and the damage done by the fall of others was very considerable.	Ditto; Constitutionnel, 16, 18 et 19 Oct.; Moniteur et Journ. des Débats, 18 et 20 Oct.; Studer; Ferrussac, Bull. des Sc. Nat. t. xviii. p. 200, t. xxvi. p. 31; Allgemeine Zeitung, 1828, Nr. 290. S. 1159, Nr. 308. S. 1231.	
— 10. About 1 ^h 30 ^m or 2 A.M.	10. Ditto, at Turin, Vercelli, Asti, Voghera, &c. More strongly felt on the right bank of the river Po than on the left. The limits of the earthquake of these three days were, Marsilles and a curve joining Vercelli, Voghera, and Genoa, being most violently felt between the two last-named places.	Two slight shocks in the space of half an hour.	.....	Several persons said that they had seen a luminous meteor shortly before the shock. The province of Bobbio, and especially the valley of Stalfora near Voghera, suffered most by this earthquake of the 8th, 9th, and 10th. Many villages were ruined in this district. The weather was very mild, and remained unusually so until the end of December.	Ditto.	
— 29. 2 A.M.	29. In the valley of Nepal, and further south.	A violent shock, followed by eight slighter ones. The	.....	The weather had been changeable for twenty-four hours before the earthquake. Soon after it became fine. At Catmandou and Patna	v. Hoff, quoting no authority.	

1.	2.	3.	4.	5.	6.
		first came from beneath upwards; no horizontal motion was then observed, but the succeeding undulations were from S to N. During the next night some more oscillations.		some buildings were thrown down. The oscillations felt during the following night were accompanied by loud noise.	
Oct. ...	In Murcia and Valencia, in Spain.	Several more shocks in the course of the month.			Authorities quoted above, 13th Sept.
Nov. 11.	San-Severo and Serrapetola in the kingdom of Naples.	A slight shock		On the evening of the 17th a new crater opened on Vesuvius.	Férussac, Bull. des Sc. Nat. t. xix. p. 209.
— 16.	In Columbia, S. America.	Two shocks			Huet, Géologie, p. 116.
— 17.	Island of Martinique	A vibratory shock		Accompanied by subterranean rolling noise	Cuvier, Hist. des Sc. Nat. t. v. p. 63.
— 21.	In the district of Reiffenberg, near Frankfort on the Maine.	Ditto		Perhaps only the same with the preceding on following accounts.	Morgenblatt, 1829, Nr. 46. S. 180, quoting an unpublished lecture of Dr. Böger of Frankfort.
— 25.	The district between Frankfort and Mayence. Not felt to the north of the Taunus Mountains.				Journal des Débats, 8 Janv. 1829.
— 26.	Sindlingen in Nassau, 6 or 7 (German?) miles N.W. of Frankfort.	Ditto, violent, from E. to W.			Kastner's Archiv, B. xv. S. 244.
— 27.	Bonn on the Rhine...	Another similar shock, also from E. to W.			Ditto.
Dec. 3.	Very widely extended. In the eastern parts of Belgium, in Lorraine, and on the Rhine, principally in a line running nearly N. and S., from Metz to Alsatia.	Very severe at Aix-la-Chapelle and other places mentioned. Very slightly felt at Maastricht and Liège. Here and at Bonn, Remagen, this phenomenon was observed, but this phenomenon was very high, and remained so during and after the shock. At Remagen the shocks were accompanied by noise, and at Stavelot and Malmédy very distinct explosions were heard. From the last to the 3rd terrible storms prevailed in the Baltic, Mediterranean, and Adriatic.			Journal des Débats, Moniteur, Constitutionnel, 8, 9 et 23 Déc., 3 Janv. suiv.; Ann. de Chim. et de Phys. t. xliii. p. 412; Kastner's Archiv, B. xv. S. 243 et 429.

La-Chapelle. Most strongly felt at Aix-la-Chapelle, Burscheid, Malmedy, Spa, and Stavelot. Also perceived at Cologne, and as far as St. Wendel, ten miles N.E. of Metz.	and Dusseldorf two shocks were perceived, lasting at Liège forty or sixty seconds. At Aix-la-Chapelle the two first shocks, which lasted but two seconds, were from S.E. to N.W., and were followed by a third, the most violent which had been felt there for ten years. It was so also at Burscheid. At Remagen the direction of the first two was N.W. to S.E., the third was vertical. At Stavelot they lasted four or five seconds. At Siegburg and Pützchen near Bonn three shocks were also felt. At Verrieren the two shocks were vertical, and only lasted a few seconds.	was probably owing solely to the storm.	Accompanied by a noise like thunder, which was heard some miles further to the east.	D. Milne's Catalogue, loc. cit.; Forcier's Notizen, B. xiii. Nr. 21 (505). S. 828. Singapore Chronicle, Jan. 1, 1829; Corresp. d. Würtemb. Landw. Vereins. 4 Heft. 1829, S. 235. Corresp. d. Würtemb. Landw. Vereins. 2 Heft. 1829, S. 115. Constitutionnel, 8 Janv. 1829; Ann. de Chim. et de Phys. t. xxix.
8. Dec. 9. Centre in Perthshire ...	A shock said to be the third within three months.			
— — — In the island of Luzon, especially at Manila.	A destructive earthquake. Lasted two minutes at Manila.			
— — — 11. In Georgia, United States.	A shock			
— — — 12. Sandgruben at the foot of the Schwendelberg.	A slight shock, followed, at 9 ^h 40 ^m , by		The second shock was accompanied by loud subterranean noise.	

1.	2.	3.	4.	5.	6.
Jan. 1.	and at Guggsberg (1 st from Reusschegg, on the way from Berne to Thun).	an extremely severe one.			p. 412.
Dec. 14. on and 2	Ditto	Two more shocks			Ditto.
— 16 3 rd or 4 th t.	Ditto	More shocks, lasting some seconds.			Ditto.
— 17	In Murcia and Valencia, in Spain. Especially at Torreveja.	Severe shocks again, forced the inhabitants of Torreveja to leave their houses.			Authorities quoted above, 13th Sept.; Journal de Frankfurt, 1829, Nr. 14.
— 29. A.M.	Macassar in the island of Celebes, and along the south coast.	An earthquake, which lasted two minutes and a half at Macassar.	The sea rose several times to a fearful height, and ebbed and flowed with indescribable rapidity on the strand.	Hulecomba suffered much injury, and the plantations around Macassar were also greatly damaged.	Correspondenzblatt v. u. f. Deutschland, 1829, Nr. 270.
— 30. ing the few days e month.	Country around Vesuvius.	Slight shocks		Accompanying a renewal of the eruption of Vesuvius in March.	Forcip's Notizen, B. xvi. Nr. 9 (359); Ann. de Chim. et de Phys. t. xlii. p. 347.
— 31. In New South Wales		A very severe earthquake, lasting five and twenty minutes (!).		Followed by a destructive tempest. Neither the exact date or locality given. I have not been able to find any confirmation of this account.	Ditto.
Jan. 1. morning of night.	Portsmouth in the State of New York.	A slight shock.			Prensa, Staatszeitung, 1829, Nr. 62, Bell.
— 4. P.M.	Berne and Freiburg				P. Mérian.
— 5. A.M. evening.	Macassar in the island of Celebes.	Recurrence of shocks (vide 29 Dec.).		No damage done.	Corresp. v. u. f. Deutschland, 1829, Nr. 270.
— 16. evening.	Torreveja in Valencia, Spain.	Four more shocks. Other slight ones occurred from time to time.		During the latter half of this month the eruption of Vesuvius was renewed, and became more considerable.	Authorities quoted under March 21.

1829. Jan. Almost every day between 2 and 3 P.M.	Alt-Schamachi in Geor- gia.	to time up to the 11th of March, when they suddenly ceased until the 21st.	.....	.....	Ann. de Chim. et de Phys. t. xlii. pp. 347. 417.
— (Some weeks before Feb. 8.)	Patras in Greece.....	Shocks almost daily felt at the period mentioned.	.....	Always accompanied by atmospheric disturb- ances (of what kind?).	Gothaische Zeitung, 1829, Nr. 50. Art. Rom.
— Feb. 7. 6 A.M.	Island of Martinique ...	Two shocks.....	.....	.....	Ann. de Chim. et de Phys. t. xlii. p. 348; Cuvier, Hist. des Sc. Nat. t. v. p. 63 et 64; Constitutionnel, 1 Juin.
— 21, and night be- tween 21 and 22.	Throughout the south of Iceland.	A vibratory shock, followed by others of less intensity on the ensuing days.	.....	Great damage in the inhabited districts lying near Hecla. Some of the peasants' cabins were completely ruined, and others much in- jured. The winter of 1828-29, which was pretty severe in Europe, was so unusually mild in Iceland that scarcely any ice or snow was to be seen.	Preuss, Staatszeitung, 1829, Nr. 104, Beil.
— 23.	Smyrna	Two shocks, of which one was very vio- lent. Both were horizontal, and in the direction N. to S. Some shocks were perceived.	.....	.....	Corresp. d. Würtemb. Landw. Ve- reins. 3 Heft. 1829, S. 186; Fé- russac, Bull. des Sc. Nat. t. xxvi. p. 32.
— End of the month.	Stockholm .....	.....	.....	.....	Corresp. d. Würtemb. Landw. Ve- reins. 4 Heft. 1829, S. 235.
— Mar. 8. (N.S.) 4 ^h 10 ^m . (According to Erman, March 7, 16 ^h 28 ^m , true time, or 16 ^h 40 ^m , mean time).	Irkutsk in Siberia, and from lat. 50° to 52° and 54°, or probably extended even further to the south, towards China. Felt at many place from Kiachta to Nischney-Udinsk.	A severe shock from N.E. to S.W. At Ki- achta and Tröitsko- Sawks it was so violent that the sen- tinels could scarcely keep their feet. In the fortress of Tun- ka, south of Lake Baikal, the vibra-	.....	At Kiachta and Tröitsko-Sawks preceded by a noise like that of the wind in a storm. At Irkutak Erman could not perceive any effect on the magnetic needle. At the fort Tunka the walls of wooden houses bent, and doors, &c. were forced open. A huge mass of rock on the right bank of the river Irkut fell; the earth opened in many places, and the ice on the river and lake was broken. The oscil- lations from the 8th to the 22nd were accom-	Poggendorff's Annalen, 2 Reihe. B. xxxix. S. 115, B. xvi. (xcii.) S. 153-157; Preuss. Staatszeitung, 1829, Nrs. 124, 135 u. 151; Ann. de Chim. et de Phys. t. xlii. p. 348; v. Humboldt, Asie Centrale, t. ii. p. 111-113, &c.

1.	2.	3.	4.	5.	6.
1. Mar. 19. Maling in Dalecarlia, Sweden. 30 ^m A.M.		tions lasted three minutes. Other oscillations followed up to the 22nd, occurring many times a day, and sometimes lasting two minutes. At Irkutsk there was first a tremulous motion of the walls, and then a sort of vibratory blow, as when a heavy door is slammed to, followed again by tremulous motion. In Nischney-I dinsh the shock was also very severe.		panied by an extraordinary subterranean noise. At Irkutsk a clattering noise was heard before the shock, which noise lasted eight or ten seconds, and seemed to recur according to a certain rule. The noise was heard very loudly in high buildings, but upon level ground and at a distance from houses it was not perceived at all, whence Dr. Kruian concludes that it was an atmospheric not subterranean sound. The sky had been clouded for some weeks before the earthquake, a phenomenon very unusual at this season at Irkutsk, where it is usually clear and dark blue. It was said by an inhabitant of the place that the cloudy sky at this season was a common antecedent to earthquakes.	Preuss. Staatszeitung, 1829, Nr. 117; Corresp. d. Würtemb. Landw. Vereins, 4 Hef. 1829, S. 235; Journ. des Débats, 4 Mars. Preuss. Staatszeitung, 1829, Nr. 223; Cuvier, Hist. des Sc. Nat. t. v. p. 53, &c. Moniteur, 10 Juillet, 20 Août, 13 Nov.; Journ. des Débats, 9 et 12 Avril; Constitutionnel, 9 et 15 Avril, 21 Juin, 6, 11 et 30 Oct.; Ann. de Chim. et de Phys. t. xxxix. p. 411, t. xlii. p. 348, t. xlv. p. 396; Gazeta de Bayona, 1829, Nrs. 28, 35, 52, 54, 55, 56, 57, 58, 73, 74, 79, 114; Ann. des Sc. Nat. t. xvi. 1 serie, p. 105; Preuss. Staatszeitung, 1829, Nrs. 102, 107, 109, 111, 118, 124, 221.
21. Kingston in Jamaica ... 20 ^m A.M.		Two shocks from E. to W., as violent as those of 1812.		Accompanied by loud notes in the air	
In the province of Murcia, Spain. Slightly perceived at Madrid, and at Beas de Segura in La Mancha. The valley of Segura seems to have been the centre of disturbance; there the shocks were most violent. M. Casas, French consul at Alcantar, supposed the		Shocks were felt on board vessels at sea off the coast, fourteen miles N.E. from Torreveja, at 6 ^h 47 ^m , 6 ^h 51 ^m , 7 ^h 3 ^m , and 7 ^h 5 ^m . The last was very severe, and lasted forty-eight seconds.		The damage done was enormous in very many towns and villages of Murcia, and in Guardamar, La Mata, and Torreveja in Valencia, some places were totally ruined, and the destruction of churches and houses, and loss of life, were terrible. The premonitory noise like thunder was heard at Torreveja for more than three quarters of an hour. It generally resembled the explosion of a cannon, and sometimes increased gradually and then suddenly ceased. It was not heard there after the 21st of March until September following. At Irkutsk	

shock to be vertical, from beneath, in the district lying between Orihuela and the sea, thus making this the centre.

eight shocks were counted between 5 P.M. and 6 A.M. the next morning. They continued with the same frequency up to the 26th, and until the 16th of April thirty or forty shocks or accompanying noises were observed. At Madrid an oscillatory motion, apparently from E. to W. or S.E. to N.W., lasting some seconds. At Granada the motion was observed to be from E. to W., or *vice versa*. At Murcia and in the whole district shaken on the 21st, shocks of more or less severity recurred daily up to the 30th.

Two severe shocks ... Another shock. Two others during the night. Another shock; slight. Another of great severity.

Two severe shocks ...

A shock ...

and Daja Vieja fissures opened in the earth, and small holes appeared, from some of which large quantities of dry sand, and from others of sand and water, were thrown out. In Estremadura the water of a lake suddenly disappeared. On the right bank of the Segura, it was remarked, the shocks were more numerous and lasted longer than on the left. The course of this river has changed, and now enters the sea at a different place from its former mouth. In Madrid the shock was sufficient to set chandeliers, &c. in motion.

Accompanied by noise like the firing of artillery. No damage done.

Ditto.
Ditto.

Ditto; Ann. de Chim. et de Phys. t. xlii. p. 348.

Authorities quoted under March 21.

De Cabrerizo, Los Terremotos de Orihuela, Valencia, 1829, 8vo, &c.

1.	2.	3.	4.	5.	6.
29. April 2. Dieppe and the neighbourhood, departm. Seine-Inférieure.		Several severe shocks; the first lasted several seconds.		The first shock was accompanied by noise like thunder.	Ann. de Chim. et de Phys. t. xlii. p. 348.
— 6. In Murcia, Spain		More vibrations, lasting twelve seconds, and followed, two hours later, by another slighter shock.		Accompanied by noise lasting ten seconds	Authorities quoted under March 21.
— 7. Petropawlowsk in Siberia.		A shock			
— 10. Pontferrada in Leon, Spain.		An earthquake			Prensa, Staatszeitung, 1829, Nr. 243.
— 13. Island of Thassus and the opposite coast of Macedonia, Turkey, extending as far as Adrianople.		The first and principal shock was horizontal and came from the N.W. It was succeeded by other slighter ones until the next day.	Felt on board the ship of the Russian admiral 'Ricord,' off the coast of Thassus.	Preceded by a violent storm of rain and snow	Ditto, Nr. 129; authorities quoted under March 21.
— About the middle of the month.				A tower and several houses on the coast were thrown down. The village of Pravi, seven or eight miles inland, lost seventy houses, and the village of Xanthi with its inhabitants was nearly swallowed up by the earth. In Adrianople some minarets and houses fell. The shock was preceded by a gust of wind from the S.E. In the island of Thassus bottles and glasses were thrown off the table.	Casseler Allgem. Zeitung, 1829, Nr. 138. S. 816, quoting Courier de Smyrna, 26 Avril.
— 16. In Murcia, Spain; places shaken on the 21st of March.		A very severe vibratory shock.			Communication of M. Aug. Brullé to M. Perrey.
— 17. Ditto; at Orihuela and some other places in same district.		More shocks			Authorities for the 21st of March.
— 18. Ditto. Felt at Villajosa (Valencia) and Cartagena.		Shocks almost as violent as those of March 21. They lasted fourteen minutes without interruption at Almoradi and Torrevieja.		Caused new misfortunes at Almoradi, Torrevieja, Salinas, and Guardamar.	Ditto.

1829. April. Night between 18 and 19.	Malung in Dalecarlia, Sweden.	A severe shock .....	.....	Accompanied by a noise in the air. This ac- count probably refers only to the event of March 18, 19.	Corresp. d. Würtemb. Landw. Ve- reins. 5 Heft. 1829, S. 289.
— — — — 21. (Six weeks after the shocks of March.)	In the mines of Zyria- nowsk and Riddersk, on the banks of the Maglenka and Oulba, in the southern part of the Altai, Siberia.	Shocks which were very considerable at the bottom of the mines.	.....	M. Gelher of Barnaul says that earthquakes are more frequent in this district than elsewhere in the government of Tomsk, which he attri- butes to the proximity of the hot springs Rakhmanowka, which rise thirty-seven leagues to the east of Riddersk. v. Humboldt says that Riddersk is the extreme western limit of the Altai earthquake region.	v. Humboldt, Asie Centrale, t. ii. p. 111-113; Fragments Asia- tiques, t. i. p. 126. 136.
— — — — 23. 9 ^h 30 ^m P.M.	Freyburg and Münster- thal (2½ miles S. by W. from Freyburg), in Baden.	A rather severe vibra- tory shock, lasting some seconds, and apparently in the direction S.W. to N.E.	.....	Accompanied by noise like thunder. Both the noise and shock were perceived in the mines near Münsterthal. At Freyburg a severe storm from the N.W. with snow followed im- mediately after. On the 2nd of May a large mass of rock fell in the Falkensteige, in the district of Freyburg.	Preuss, Staatszeitung, 1829, Nr. 126.
— — — — 24. 1 ^h and 1 ^h 20 ^m P.M.	Almoradi and the envi- rons, in Murcia, Spain.	Renewed severe shocks.	.....	Heavy rain fell almost the whole month through- out in Spain, producing great inundations.	Authorities for 21 March.
— — — — ...	Jackson (County?), Ten- nessee, United States.	Rather severe vibra- tory shock, of long duration.	.....	.....	Preuss, Staatszeitung, 1829, Nr. 181, Beil.
— — — — May 2.	Again in the province of Murcia, Spain.	No less than fifty-one shocks on this day.	.....	An account from Madrid of the 4th says that severe shocks had been felt at Puebla de Se- nabria not far from Valladolid, no damage done.	Authorities quoted above for March 31; Allgemeine Zeitung, 1829, Nr. 140. S. 557.
— — — — 4.	In the mountains of Al- bano, near Rome.	Vertical shocks .....	.....	.....	Corresp. d. Würtemb. Landw. Ve- reins. 6 Heft. 1829, S. 337.
— — — — 5. After noon.	On the coast of Macedo- nia and Thrace. Felt from Salonichi to Con- stantinople, and at the same time even in Bu- charest. Most violent in the southern part of the district shaken.	Several violent shocks, which at Salonichi frequently recurred until the 10th. At Adrianople the mo- tion of the earth had continued al- most every day from the 13th of April to the 5th of May.	.....	In Salonichi, houses, mosques, and part of the town walls were thrown down. The little town of Drama was totally destroyed, and many of the surrounding villages were much injured. The towns of Kawala and Seres also suffered much. A mountain about ten miles from Drama suddenly poured forth a kind of reddish water.	Preuss, Staatszeitung, 1829, Nr. 188, Beil.
— — — — 15 to 17.	Torreveja in Murcia, Spain.	Fifty-three more alight- ing shocks.	.....	.....	Authorities for the 21st March.

1.	2.	3.	4.	5.	6.
May 19 A.M. to 2 P.M. of the h.	City of Mexico	Six violent shocks in the time mentioned. They recurred at in- tervals for two or three days.			Moniteur, 8 Août.
— between and 22.	Albano, Genzano, La Rocca, and especially Castel Gandolfo, in the States of the Church.	Some shocks, follow- ed by others for several days, the whole number amounting to four- teen or sixteen.		Houses were violently shaken, and one thrown down.	Journ. des Débats, 13 et 23 Juin; Moniteur, 23 Juin; Féruasac, Bull. des Sc. Nat. t. xxvi. p. 32; Preuss. Staatszeitung, 1829, Nr. 165; Ann. de Chim. et de Phys. t. xlii. p. 348, 349.
— 22. 4.30 A.M.	Graz in Austria. Felt in many parts of the town, and several of the suburbs. Not all felt in the suburbs on the right bank of the Mur.	A rather violent shock, in the di- rection N.E. to S.E. (?). Also said to have been per- pendicular, and to have lasted about a second.		Proceeded by uninterrupted rain for eight days, which began again heavily immediately after the shock, but lasted only half an hour. The sky then cleared, and fine warm weather set in. In some places the shock seemed as if a heavy weight had been let fall on the roof. No damage done.	Preuss. Staatszeitung, 1829, Nr. 157.
— 23. M.	Constantinople and Sen- tari.	Two shocks.		No damage was done in Constantinople, but on the Asiatic side buildings were injured. The castles of the Dardanelles also received some injury.	Preuss. Staatszeitung, 1829, Nr. 184. S. 955.
— 29. (A.M.?)	Island of Jamaica	A very severe shock, followed frequently by others up to June 7.			Preuss. Staatszeitung, 1829, Nr. 203; Moniteur et Constitutionnel, 21 Juillet, &c.
— ..	In the town (County?) of Jackson, Tennessee, United States.	Rather violent earth- quake.		This account and that of April probably refer to one and the same event. The month of May was marked by storm and rains in many parts of Europe.	Corresp. de Württemb.; Landw. Ver eins. 8 Heft, 1829, S. 115.
June 1.	Albano in the States of the Church.	Several shocks on this and some prece- ding days, more se- vere than those of May. At 10 A.M. a slight shock from E. to W. was felt at Boun (in all proba- bility Bona).		Some damage done at Albano	Preuss. Staatszeitung, 1829, Nr. 170; Journ. des Débats, 13 et 23 Juin; Moniteur, 23 Juin; Féruasac, Bull. des Sc. Nat. t. xxvi. p. 32.

1829. June 1 to 5.	Torreveja in Valencia, Spain.	Sixty-eight shocks in the period mentioned, of which thirteen were very severe.	.....	On the 7th a violent storm of rain, producing inundations.	Authorities for March 21.
— Night between 2 and 3.	On the Schneekoppe, Riesengebirge.	Three shocks	.....	On the 2nd the usually clear mineral waters of Warmbrunn in Silesia appeared blue and milky.	Dorfzeitung, 1829, Nr. 110; Preuss. Staatszeitung, 1829, Nr. 169, B, Nr. 175, B.
— 4.	Lunrøe in Norway	A feeble shock	.....	.....	Keilhau.
— Night between 8 and 9.	In the mountains of Albano near Rome.	Shocks	.....	.....	Corresp. d. Würtemb. Landw. Vereins. 7 Heft. 1829, S. 53.
— 10 to 15.	Torreveja in Valencia, Spain.	Twenty-four more shocks, of which one was terrible and almost as severe as that of March 21.	.....	.....	Authorities for March 21.
— 13.	Albano in the States of the Church.	.....	.....	.....	Moniteur et Journ. des Débats, 23 Juin; Férussac, Bull. des Sc. Nat. t. xxvi. p. 32.
— In the middle of the month.	In Island of St. Thomas in the West Indies.	An earthquake	.....	.....	Corresp. d. Würtemb. Landw. Vereins. 8 Heft. 1829, S. 116.
— 17. In the evening.	At Murcia in Spain	Six shocks	.....	.....	Authorities for 21st March.
— 18.	Ditto	Two more shocks, followed by others the next day.	.....	.....	Ditto.
— 19. At sunrise.	Almoradi in Murcia	A severe shock, followed by a slighter one at 6 A.M., and by another at 6 ^h 30 ^m P.M.	.....	.....	Ditto.
— 24. 7 ^h 10 ^m P.M.	Paris	Several vibratory shocks, on the authority of some people living in the Rue du Mont, Parnasse.	.....	.....	Journ. des Débats, 5 Juillet; Constitutionnel, 4 Juillet; Ann. de Chim. et Phys. t. xlii. p. 349.
— 26.	Caen in the departm. Calvados, and the neighbourhood.	A slight shock, lasting two seconds.	.....	.....	Ditto.

1.	2.	3.	4.	5.	6.
9 June 28. Ortuella and San-Pedro-del-Pinodar, in Murcia, Spain.		Violent earthquake. Although of diminished severity the shocks were still frequent at Ortuella.			Authorities quoted under 21 March.
— July 1. Debreczin, Vámos, Pétervárad, Karczag, Nagy-Károly in the county of Tolna, Szathmar, Erőss, and several other places in Hungary, included in a district of about forty-five geographical miles from E. to W., by ten from N. to S.		Several shocks. At Debreczin the first shock occurred about 2½ after midnight; at 4½ ²⁴ A.M. two more of greater severity; and in the evening at 8½ 28 ²⁹ P.M., three violent horizontal shocks in the direction E. to W. At Nagy-Károly the first shock was at 4 A.M. and at 8½ 49 ⁵⁰ P.M. there were two more vibratory, from N.E. to S.W. or S.W. to N.E.; each of these vibrations lasted two seconds, and the interval between them was about the same. The shocks recurred at these places on the 2nd and 7th July. In Debreczin no shock had been felt since 1746.		At Debreczin the day before had been sultry and rainy; heavy rain also fell in the forenoon of the 1st; and at the time of the shocks felt in the evening there were reddish clouds in the horizon, and an appearance of a light for two seconds like lightning was observed. These last shocks were accompanied by subterranean noise. At Nagy-Károly the shocks at the same time (8½ 40 ⁴¹ P.M.) were accompanied by a noise compared to that of a waggon laden with empty casks. At this place loose articles were set in motion, the springs disturbed and muddled (perhaps produced only by the preceding heavy rain), and various animals, particularly cats and dogs, rendered very uneasy. The barometer was not affected. The storms, thunder and lightning, rain, and hail, of this month and the preceding were very remarkable in many parts of Europe. vid. v. Hoff.	Prenu, Staatszeitung, 1829, Nr. 200, Nr. 218, B, Nr. 236.
— 2. In the province of Murcia, Spain.		Repeated shocks,			

Beginning of the month.	Marseilles.				stitutionnel, 17 Juillet.
Night between 3 and 4.	Zwolle in Ober-Yssel, Holland.	A slight shock.....		The weather had been stormy before, but at the time of the shock it changed to a perfect calm.	Preuss, Staatszeitung, 1829, Nr.197.
15.	Vitry and in the department de l'Aube, France.	An earthquake		v. Hoff mentions a severe hailstorm in this district, but does not speak of an earthquake.	Communication of M. Aug. Bravais to M. Perrey.
24.	Almoradi and the neighbourhood, Murcia, Spain.	More shocks		A violent storm of lightning, and hail of unusual size (some of the hailstones weighing 10 or 12 oz.), during intense heat.	Authorities for 21st March.
27.	In the district of Hungary shaken on the 1st.	Three more shocks.....			
About 1 P.M.	Neusohl in Hungary ...	An earthquake.....		No damage done.....	Corresp. d. Würtemb. Landw. Vereins. 8 Heft. 1829, S. 134.
5h 15m P.M.					Preuss, Staatszeitung, 1829, Nr.235.
Aug. 3.	Lunrøe in Norway	Two more shocks			Keilhan.
4.	In Hungary again	Undulatory shocks, lasting four seconds.		Great damage done to buildings, especially at Nagy-Karoly, Endred, Dengeley, Zriny, and Portelek. No earthquake had been observed in this region for 100 years before.	Corresp. d. Würtemb. Landw. Vereins. 8 Heft. 1829, S. 237.
2 A.M.					
7.	Colmar, St. Dié, Strasbourg, Belfort, Pontroy, and several other places in Alsace. Most severe at the two last named places.	Several shocks, in the direction N. to S.		Accompanied by a noise like distant thunder. More strongly felt in the mountains than in the low country.	Le Globe, 9 Sept.; Férussac, Bull. des Sc. Nat. Oct.; Ann. de Chim. et de Phys. t. xlii. p.349; Corresp. d. Würtemb. Landw. Vereins. 8 Heft. 1829, S. 237.
3 A.M.					
17.	Copenhagen, Gothenburg, Christianshavn, and Amager, in Denmark.	A rather severe shock. In Copenhagen it lasted several seconds, and came from the N.W.	Also felt on board a steam-vessel at anchor off Dobberan.	In Copenhagen preceded by a hollow sound like that of a carriage passing under a gate-way. Moveable articles and even the walls were caused to oscillate. No effect on the barometer. This was the first shock felt in Copenhagen since the date of the great earthquake of Lisbon.	Preuss, Staatszeitung, 1829, Nr. 238 u. 249; Moniteur, 3 Sept.; Ann. de Chim. et de Phys. t. xlii. p.349; Keilhan.
(or 18?) 3h 30m P.M.					
20.	Port Antonio in Jamaica	Two slight shocks (another account says, a severe earthquake).			Preuss, Staatszeitung, 1829, Nr.315; Ann. de Chim. et de Phys. t. xlii. p. 348; Cuvier, Hist. des Sc. Nat. t. v. p. 63.
6h 55m P.M.					
Night between 31st and Sept. 1.	Verkotoemsk in the government of Wologda and Chenkoursk in	In Wologda, three vibratory shocks in fifteen minutes. In		During calm weather in Wologda, accompanied by subterranean noise. The buildings oscillated, and the lamps were thrown off from a	Preuss, Staatszeitung, 1829, Nr.353; v. Humboldt, Asie Centrale, t. ii. p. 119; Moniteur, 31 Déc.

1.	2.	3.	4.	5.	6.
1822, Aug. Night between 31 and Sept 1. 2 ^h 30 ^m P.M.	that of Archangel, Russia. New South Wales	Archangel there were but two shocks. A violent earthquake.		freely suspended chandelier. In Archangel, no noise and no damage done. The storms of July still continued in many parts of Europe. During a dreadful tempest. The earth was raised up in waves like the sea, forming in many places terrible fissures.	Asiatic Journal. Ditto, N. S. vol. vii.
11 ^h 45 ^m A.M. 3 ^h 25 ^m P.M.	In the island of Erro- manga, one of the New Hebrides. Island of Martiniague	A trifling shock			Moniteur, 8 Nov.; Constitutionnel, 16 Dec.
6.	Cremona in Italy	Rather a severe earth- quake in the direc- tion S. to N., con- sisting of several oscillations of about four seconds' dura- tion. At 8 ^h 15 ^m P.M. the oscillations recurred, and lasted three seconds. A shock, from S.W. to N.E.		Accompanied by subterranean noises, as were the shocks at 8 ^h 15 ^m . Cracks opened in several places in the vault of the church of St. Do- minica, several other buildings were injured, and bells were made to toll. The sky was cloudy, and the wind from the N.; soon after the sky cleared and the sun shone forth.	Pressa, Staatszeitung, 1829, Nr. 263.
9.	Frankfort on the Maine.			H. Hoff doubts this account, as a kind of whirl- wind passed over the city at the same time, to which he ascribes the report of an earth- quake.	Ditto, Nr. 259, Bel.; Allgemeine Zeitung, Nr. 258, Bel. S. 1031; Constitutionnel, 17 Sept. Authorities under March 21.
10.	In the neighbourhood of Granada, Spain.	Three shocks			Moniteur, 9 Nov.; Constitutionnel, 16 Dec.
9 ^h 45 ^m P.M.	Island of Martiniague	Two shocks, of which the second was vio- lent. Direction = S. to N.	On the 26th and 27th of October a violent "raz de marée" on the coast of Mar- tinique.		
19.	Torreveja in Valencia, Spain.	At least fifty shocks in this period.			Authorities for March 21.
24.	Murcia, Orihuela, and the neighbourhood.	An earthquake which recurred during the following night.		Storms and heavy rains continued to prevail in many parts of Europe during this month. Vid. v. Hoff.	Ditto.
Oct. 20.	Anboune in the Canton of du Vaud, Switzerland.	Several shocks		A brilliant meteor was also observed here which crossed with a loud crackling sound.	Corresp. d. Wärschb. Landw. V. d. Schweiz. Anst. 1854, p. 1.

gives the date Oct. 10, 10 ^h 30 ^m P.M.) 1829. Oct. 5. 10 ^h 5 ^m A.M.	In the district of Mürz- suschlag, circle of Bruck, Styria. Ex- tended as far as the Austrian territories.	An earthquake, whose direction was N.E. to S.W.	.....	Threw down a piece of wall	Preuss, Staatszeitung, 1829, Nr. 297, Beil.
— 9. Lunrøe in Norway	Two shocks	Two shocks .....	.....	.....	Keilhan.
— 12. Gessenay, Saanen, in the canton of Berne, Switzerland.	A rather severe shock.	A rather severe shock.	.....	Accompanied by subterranean noise, which seemed to come from different quarters. The beds trembled. The same day a great cleft opened in a mountain in the valley of Six. On the 15th also the earth sank, and clefts appear- ed on Mount Blonay in the Canton du Vaud.	Journ. des Débats, 1 Nov.; Ann. de Chim. et de Phys. t. xlii. p. 349; Preuss, Staatszeitung, 1829, Nr. 308.
— 13. Murcia, Orihuela, &c., in Spain.	More shocks	More shocks .....	.....	.....	Authorities for March 21.
— 19. Granada in Spain	At 1 A.M. a slight movement, scarcely perceptible; at 4 ^h 15 ^m another shock, stronger, but lasting only half a second. At 3 ^h 45 ^m P.M. a third shock, of equal force and duration.	At 1 A.M. a slight movement, scarcely perceptible; at 4 ^h 15 ^m another shock, stronger, but lasting only half a second. At 3 ^h 45 ^m P.M. a third shock, of equal force and duration.	.....	Accompanied by subterranean noise. No damage done.	Ditto.
— 24. Ditto	Another shock, the last recorded of the long series of dis- turbances: this year in Spain.	Another shock, the last recorded of the long series of dis- turbances: this year in Spain.	.....	Besides the violent storms of wind and rain of Ditto. this year several other unusual phenomena had been observed in Spain, as luminous me- teors, halos round the sun and moon, extra- ordinary and unseasonable alternations of heat and cold, &c.	
— 26. Valparaiso and Santiago (The date Sept. 26 is also given.)	A shock nearly as vio- lent as that of 19 Nov. 1822, but of much shorter dura- tion, lasting but twenty seconds.	A shock nearly as vio- lent as that of 19 Nov. 1822, but of much shorter dura- tion, lasting but twenty seconds.	.....	In Valparaiso a great many houses were more or less ruined, and in Santiago, where the earth- quake was more violent, many persons lost their lives. The village of Casa Blanca, thirty miles from Santiago, was completely ruined. The destruction of buildings was however not so great as in 1822.	Preuss, Staatszeitung, 1830, Nr. 49, Beil. S. 351; Froriep's Notizen, B. xxvii. Nr. 12. S. 186; Ann. de Chim. et de Phys. t. xlv. p. 398; Leonhard und Bronn. N. Jahrb. 1834. S. 459.

within half a
minute
(least).

in the S.W. part of the
region shaken.

tween 7 and 8 p.m.
another, very slight,
vibration was felt.
At Kischenew in
Bessarabia the mo-
tion lasted three
minutes. At Kiew,
four minutes. At
Chorol the vibra-
tions were slight,
but lasted ten mi-
nutes. At Jekate-
rinoslaw the dura-
tion of the motion
was some seconds
only. At Reni and
Ismail the shock re-
curred at 8 p.m. At
Orachakoff a shock
was felt at 3 a.m.,
but nothing at 4.
At Iwanowka the
shock was very se-
vere. At Odessa
Haury was awakened
by slight oscilla-
tions, which lasted
about two-thirds of
a minute, and were
followed by a pretty
severe shock of some
seconds' duration.
After renewed os-
cillations for about
a minute, there
came a second, very
severe, shock, which
lasted longer than
the former. The
oscillations then
again decreased and

the motion was more strongly felt in the
higher parts of the town than in the lower,
and, in a stone building situated on an emi-
nence, the south side only was injured, while
the north suffered not at all. At Nikolajew
accompanied by subterranean noise, like boil-
ing. At Odessa the barometer was carefully
observed during the earthquake, but did not
show the least change. The magnetic needle
could not be observed.

1.	2.	3.	4.	5.	6.
1829 Nov. 27. La Rochelle and Roche- fort, in the departm. 4 ^h 5 ^m P.M.		<p>increased fortwelve or fifteen seconds, a third shock, shorter and weaker than the first, occurred, then again the oscillations, and then the last shock, equal to the third, and lasting three or four seconds. Then a decreasing tremulous motion for about 1½ minute, and at 4^h 2^m 27^s all was still again. Many counted 152 vibrations in thirty seconds. The direction was found by a water bottle in which the water, raised by the shock, had washed off some of the dew on opposite sides of the glass. The line joining the two highest points of the curves thus produced on the dew glass lay 2° west of the astronomical meridian.</p>	The crews of three ships reported that	<p>Proceeded by two loud explosions; the first was of not moderate intensity, but the second was</p>	<p>Ann. de Chim. et de Phys. t. xlii. p. 360; <i>Féruce</i>, Bull. des Sc.</p>

1829. Nov. 27.	Mondavio and Todi in the States of the Church.	blow was felt.	imagined their vessels had touched the bottom.	This and the explosions lasted at most four or five seconds. The explosions seemed to take place high in the air towards the south, and were quite unlike thunder, but were supposed by many to have arisen from the explosion of a powder magazine. The vibratory motion made the windows rattle, and moved some few articles which did not stand firmly. Several animals exhibited unusual restlessness a moment before the noise was heard. The barometer had been very low, and remained quite steady at the time of this phenomenon, but soon after began to rise.	Preuss. Staatszeitung, 1829, Nr. 353, Beil.
— 29.	Ditto	A vibratory shock		Preceded by a violent gust of wind	Ditto.
— 30.	Innsbruck in the Tyrol.	Ditto		The day was calm and foggy. The barometer was not affected by the earthquake.	Ditto, Nr. 346.
8 P.M.		A slight, almost vertical shock.			Ditto.
— Dec. 1.	Ditto	Ditto			
2 A.M.		A rather severe shock.			Ann. de Chim. et de Phys. t. xlii. p. 350; Férussac, Bull. des Sc. Nat. Avril 1830.
— 5 A.M.	6. La Rochelle and the environs for three or four leagues round. Also in Medoc, and other districts of the departm. Gironde.				
— 4 ^h 30 ^m A.M.	9. Santa Fé-di-Bogota in Columbia, S. America. Also felt at Santa Anna, Honda, Cartago, and la Vega de Tupia; thus over a space of 6° of longitude, between the eastern and central chain of the Andes.	A slight vibratory shock, lasting four or five seconds.			Ann. de Chim. et de Phys. t. xlv. p. 402.
— 9 ^h 55 ^m P.M.	10. In the circle of Neustadt, Illyria.	Another shock, the most violent of the three felt since November 2. Lasted four seconds.			Corresp. d. Würtemb. Landw. Vereins. 12 Heft. 1829, S. 325.

1.	2.	3.	4.	5.	6.
Dec. 22	Bellevue in the department of l'An, France.	A shock of considerable severity and long duration.			Ann. de Chim. et de Phys. t. xlii. p. 351.
—	A Country around Vesuvius.	Some tremblings of the ground.		Accompanied by subterranean noise like boiling. The volcano began to throw forth flame and stones, but no lava appeared.	Moniteur, 1830, Nr. 26. p. 78, Nr. 27. p. 81.
— 29	Bellevue in the department of l'An, France.	Another shock.			Communication of M. Aug. Bravais to M. Perrey; Modenzeitung, 1830, Nr. 6. S. 48.
—	Hermannstadt in Hungary.	A very violent shock, which lasted a minute.		The weather was very cold up to the time of the shock, but became warm afterwards. For the various storms and other violent meteorological disturbances of this year vid. v. Hoff.	Ann. de Chim. et de Phys. t. xlii. p. 351.
Jan. 8.	Near Waldheim in Saxony, on both banks of the Tselopa.	A slight shock.	On the 10th the sea rose suddenly to an unusual height on the west coast of Holland, and caused considerable injury to the dykes, &c. v. Hoff.	Accompanied by subterranean noise. On the 7th the water of the lake near Sabungen in the Duchy of Meiningen was strongly agitated, so that ice of 2 feet thick upon it was broken. v. Hoff.	Dorfzeitung, 1830, Nr. 23.
— 26. 10 ^m A.M.	Lucca.	A slight vibratory shock, followed by another at about 5 ^h , and a third about 5 ^h 30 ^m . The last two were rather severe and lasted more than 5 secs.			Preuss. Staatszeitung, 1830, Nr. 45. S. 316; Ann. de Chim. et de Phys. t. xlv. p. 402; Péroussac, Bull. des Sc. Nat. t. xxiv. p. 152.
—	Gutenstein in the circle of the Wiener Wald, Austria.	A violent vibratory shock.			Preuss. Staatszeitung, Nr. 61. Beil. S. 441.
—	Nauplia in the Peloponnesus.	An earthquake.			Communication of M. Colla to M. Perrey.
Feb. 4. 10 ^m A.M.	Hieslau in the circle of Bruck, Styria. Felt throughout the whole district of Hieslau.	A vibratory shock followed, in a quarter of an hour, by a violent oscillatory motion, and then a		Accompanied by a noise like that of the wind in a storm. The second shock was attended with a dull noise like thunder. The motion was so violent that people who were in bed thought they should be thrown out of bed.	Preuss. Staatszeitung, 1830, Nr. 61. Beil. S. 441.

<p>1830. Feb. 8. Agram in Hungary..... 10^h 40^m A.M. (The Ann. de Chim. et de Phys. gives the date Feb. 7.)</p>	<p>severe shock. The oscillation was from N.E. to S.W., and lasted about 5 secs.</p>	<p>A shock of 2 secs. du- ration.</p>	<p>windows rattled; wooden houses and bridges cracked; pictures and mirrors swung out from the walls, and loose plaster fell from the ceil- ings. The day was calm and clouded, but the day before had been clear. No damage to men or buildings ensued.</p>	<p>Ditto, No. 53, Beil. S. 381; Ann. de Chim. et de Phys. t. xlv. p. 402.</p>
<p>27. Lauterbrunnen in the canton of Berne, Swit- zerland. Nauplia, Egina, and in Greece.</p>	<p>A shock in the direc- tion N. to S., last- ing 4 secs. Several shocks</p>	<p>An earthquake, of 10 seconds' duration. At Andrejewskaja the direction of the shocks was N. to S., and they recurred for nine days. At Tiflis also the di- rection was N. to S., and the motion lasted 20 secs. At Fort Bournoi the</p>	<p>In Andrejewskaja a church fell, and more than 400 of the inhabitants were buried beneath the mud roofs of their houses. A cleft was produced in a neighbouring mountain, and one half sank considerably. The shock was followed by a gust of wind lasting 10 minutes. A similar violent wind for 10 minutes was ob- served at Tiflis. At Fort Bournoi no damage was done, but at Torki 200 houses were ruined and many others injured.</p>	<p>Moniteur, 22 Mars. Communication of M. Colla to M. Perrey. Ann. de Chim. et de Phys. t. xlv. p. 402; Das Ausland, 1830, Nr. 200. S. 800; Preuss. Staatszei- tung, Nr. 101. S. 752, Nr. 130. S. 978; Gaz. de Tiflis, Nrs. 17 et 25; Constitutionnel, 25 Juin; v. Humboldt, Asie Centrale, t. ii. p. 119.</p>
<p>Mar. 9. Kisliar on the Terek (Caucasus), and still more violently in the village of Andrejewa- kaja. Also felt at Tiflis, at Fort Bour- noi, and at Torki. Said also to have ex- tended to Moscow.</p>	<p>According to others, 12.) N. S. 1^h 10^m P.M.; at Fort Bour- noi, 1^h 30^m.</p>			

1.	2.	3.	4.	5.	6.
1830. Mar. 9. Astrachan 4 ^h (?) 30 ^m P. M.		motion was rather severe, and lasted about 2 minutes. Shocks lasting together 30 seconds.		Great inundations were produced by the breaking up of the ice on the rivers of the East of Europe at the end of this month.	Authorities quoted above (on the 9th).
2 ^h 30 ^m P. M.	21. Island of Martinique ...	A shock			Cuvier, Hist. des Sc. Nat. t. v. p. 96; Ferrussac, Bull. des Sc. Nat. t. xxiii. p. 50; Cotta, Giornale Astron. 1833, p. 71; Monteur, 18 Juin; Eyrès, Novv. Ann. des Voyages, Juillet, p. 123.
11 ^h 30 ^m P. M.	29. Port-au-Prince in St. Domingo.	A violent shock, lasting more than two seconds.			Ditto.
0 ^h 30 ^m A. M.	30. Ditto	Ditto			Ditto.
1 A. M.	Ditto	Ditto			Ditto.
Apr. 1. At Guatemala		Some shocks			Authorities given under the 21st Apr.
4. Egleau in the canon of Zurich.		A vibratory shock		On the 6th Vesuvius was in a state of activity	Preuss. Staatszeitung, Nr. 145, Beil. S. 1093.
12. Guatemala		Thirty-five more shocks, some severe, some slight.		Several villages, in particular Amatitlan, Finula, and Petasas, were ruined.	Authorities for the 21st April.
14. Island of St. Domingo...		Two other shocks, more violent than those of March 29.		Accompanied by noise like distant thunder when on board vessels, it loses itself in the echoes of mountain ranges. Houses of brick and stone suffered severely. It was remarked that in the Leeward Isles earthquake shocks were generally in the direction of the meridian, i. e. either from N. to S. or S. to N.	Authorities for March 21.
About 6 ^h 30 ^m P. M.		Duration = 4 or 5 seconds. The first shock was from E. to W., and the second from W. to E. A shock from E. to W.		The shocks were felt on board vessels, both in port and on the open sea.	
20. Soleure and on the banks of the Aar, Switzerland.				During a tempest which extended over all Germany and continued up to the night of the 21st.	Preuss. Staatszeitung, Nr. 129, Beil. S. 973, Nr. 116, Beil. S. 574; Merian; Stuler.
Fifteen wersts west of Baku in Georgia.		An earthquake			Preuss. Staatszeitung, Nr. 199, Beil. S. 1502.
21. Guatemala		Forty-two shocks in			Preuss. Staatszeitung, Nr. 201, S. 2003; Der Arbeiter, Nr. 201, S. 2003.

4 A.M. to 22, 5 P.M.	the period mentioned, some severe, others slight.			1830, Nr. 315. S. 1256; Férussac, Bull. des Sc. Nat. t. xxvi. p. 32; Colla, Giorn. Astron. 1833. p. 72.
1830. Apr. 23. 9 P.M.	A violent shock		Several houses were much injured. A village, 6 leagues from the city, was entirely destroyed.	Ditto.
— 27. Ditto	More shocks. They did not cease until the 18th May.		More houses injured	Ditto.
— May 9.	Teheran in Persia		The city suffered much	Preuss, Staatszeitung, Nr. 174. S. 1320.
— 11. In the evening.	Eglisau in the canton of Zürich.		Accompanied by very loud noise. The houses were caused to rock.	Ditto, Nr. 145. S. 1093; Mérian; Studer.
— 18.	Reggio in Calabria		Accompanied by subterranean noise. On the 16th a great eruption of Etna.	Le Moniteur, 21 et 24 Juin; Preuss, Staatszeitung, Nr. 165. S. 1252.
— June 8.	Kindberg and Mürz-zuschlag in Styria.			Preuss, Staatszeitung, Nr. 195, Beil. S. 1491.
— 10. 8 P.M.	Werchne-Udinsk in the government of Irkutsk, Russia.			Ditto, Nr. 258. S. 1974.
— 19. 9 ^h 30 ^m P.M.	Island of Martinique			Authorities for March 21.
— 26. 5 ^h 57 ^m A.M.	Grätz and Bruck in Styria. Also felt at Leoben.		Windows rattled, and plaster fell from the ceilings. The air was calm, but somewhat thick and foggy. The barometer exhibited no particular change.	Preuss, Staatszeitung, Nr. 187. S. 1428.
— 26 and 27.	In China; in the province of Honan, and the parts of Pe-Tscheli between 35° and 37° N. lat., to the south of Pekin.		Preceded by terrible portents. Some days before the earthquake burning vapours filled the atmosphere, dull explosions were heard in the air, long bands of fire appeared on the horizon (thunder and lightning?), and when the first shock was felt a violent storm of rain and hail burst forth over the land. The continuation produced by the earthquake was so great, that no accurate accounts had been collected of the damage done, but it was known that 12 towns had been swallowed up or more	Garnier, Météorologie, p. 167; Gotha'sche Zeitung, 1831, Nr. 140.

1.	2.	3.	4.	5.	6.
1830. June....	At the Cape of Good Hope.	An earthquake		or less injured. At the same time the district of Chung-Tung-Kou at the other extremity of Pe-Tache-Li, was visited by a terrible tempest, with hail of enormous size, and productive of dreadful inundations. It was supposed at Canton that 6000 or 7000 perished altogether in these convulsions of nature.	Das Ausland, 1831, Nr. 115. S. 460.
— July 5 A.M.	Huszth in the county of Marmarosch, Hungary. The last shock was also felt at Szeged, and at the mines of Sugatagh and Slatina.	Three extremely severe shocks, followed at 9 P.M. by a very violent one. Direction of the shocks = S. to N.		Two large masses of rock were detached and rolled down from Table Mountain. The larger mass was estimated at 40 or 50 tons. The accompanying loud noise lasted 45 seconds, and produced much uneasiness in Cape Town.	By the last shock (at 9 P.M.) many houses were injured.
— 9.	In the island of Ægina...	A slight earthquake			Preuss, Staatszeitung, Nr. 236. S. 1808.
— 13.	Messina and Catania in Sicily.	Severe shocks			Garnier, Météorologie, p. 96.
— Aug. 2.	At Murcia in Spain	An earthquake, the direction of which was the same as that of March 8, 1829, namely N.E. to S.W. Consisted of two rather violent shocks.		Accompanied by a dull noise, which lasted nearly a minute. No other attendant phenomenon of note was observed, except a visible moisture in the atmosphere (mist?).	Colla, Giornale Astron. 1833, p. 74. Preuss, Staatszeitung, Nr. 275. S. 2107.
— 8.	Kiahta in Siberia	An earthquake			Colla, Giornale Astron. 1833, p. 74.
— 27 th A.M.	Clagenfurth and neighbourhood, Seutschach, Forlase, and Loibl; in Carinthia.	A slight vibratory shock, lasting about			Das Ausland, 1833, Nr. 302. S. 807.
— Sept. 1.	Erromanga Bay in the New Hebrides.	Also felt at sea			

Sept. 9. In the Swabian Alps, especially in a part of the bailiwick of Münstingen. Very perceptible in Heyningen, Zwiefalten, Münsingen, Buttenhausen, Egingen, &c., throughout the Alps of Zwiefalten. Also felt at Scheer in the bailiwick of Wangen.	A vibratory shock, the direction of which, as well as of those of the following days, was S. to N., stretching probably somewhat to the E. Duration of the shock = 2 seconds.	Articles of furniture rattled together, easily shaken objects were moved, and the plaster fell off here and there from the ceilings. People who were in the house felt as if the whole building were shaken by a direct shock or by a violent thunder-stroke.	Schweigger u. Seidel, N. Jahrbuch d. Chemie, Th. v. S. 279.
— 10. Ditto	Another shock, of equal duration with the last.	Ditto.	Ditto.
— 12. Ditto	Another shock, more violent than either of the two preceding, and lasting three seconds.	At Münsingen, Tübingen, and Stuttgart, the barometer fell about the time of the shock, but, as v. Hoff remarks, this fall was observed over a district of Europe too extensive to render it probable that it was in any way connected with the earthquake.	Ditto.
— 16. Manila in the island of Luzon, Philippine Isles.	Some shocks	During a typhoon	In M. Perrey's Memoir on Earthquakes in the basin of the Rhine, p. 90.
— 19. In Ober-Marchthal, at the southern foot of the Swabian Alps.	A feeble shock		Schweigger u. Seidel, N. Jahrbuch d. Chemie, Th. v. S. 272.
— 23. Again in the Swabian Alps. Felt, at the same time, at Kalw, in the bailiwicks of Urach, Münsingen, and Balingen, at Onstmettingen, near Ober-Marchthal at the southern foot of the Alps, in the western part of the bailiwick of Saulgau, and in that of Marbach.	At Kalw three shocks quickly succeeding each other were felt. The direction seemed to be W. to E. In the bailiwick of Münsingen, in Heyningen, Buttenhausen, Apfelfelsten, Oberwiltzingen, and Huldretten, the same observations were made; the motion passed	Accompanied at Kalw by a rolling noise. Buildings and furniture were made to vibrate. The air was calm. At the other places mentioned in Column 3, houses were also shaken, doors opened, &c. At Buttenhausen the shock was particularly felt in the houses on the water's edge. On the morning of the 22nd the barometer reached its lowest point for the month. From then until the morning of the 23rd it rose rapidly, then fell slowly during the whole day. On the 22nd heavy rain fell all day, with southerly and westerly wind. At the time of the earthquake the rain had stopped, and the sky was clouded, but in the evening	Ditto.

1.	2.	3.	4.	5.	6.
Sept. 21. 10 th P.M.	Ditto, particularly at Onstmettingen in the bailwick of Balzogen	from W. to E., and lasted six or eight seconds. Another shock, the last felt in this region of the Alps. Two slight shocks, each of which lasted about fifteen seconds.		the rain began again.	The sky was clouded, and rain fell occasionally. The barometer fell slowly something below its mean height.
— 26. Lisbon					Preuss. Staatszeitung, Nr. 305. S. 2354.
— 28. Oporto.		A shock			Colla, Giornale Astron. 1853, p. 74.
Oct. 3. In the island of Agina, Greece.		Two feeble shocks			Ditto.
Nov. 23. In the Duchy of Baden.		Several shocks, apparently in the direction S.W. to N.E.			Preuss. Staatszeitung, Nr. 227. S. 910; Preuss. Staatszeitung, Nr. 335. 339 u. 346; Mérian; Ann. de Chim. et de Phys. t. xlv. p. 402; Colla, Giorn. Astron. 1853; Studer.
— at Freiburg, Mühlheim, and Lörrach; and at St. Louis, Multhausen, Bäle, and Strasburg. Also felt at Derne.		At Bäle (6 th 4 th) the shock was very violent.			
— of the 14 th .	About Vesuvius	Subterranean disturbances on several days.			Dorferzeitung, Nr. 227. S. 910.
Dec. 2. 5 th A.M.	In the mine "Neue Hoffnung Gottes" at St. Blasie in Baden.	Another strong vibratory shock.			Preuss. Staatszeitung, Nr. 346. S. 2690; Mérian.
— 8 A.M.	Innsbruck in the Tyrol.	A shock from N.W. to S.E. Lasted six seconds, with constant intensity.			Preuss. Staatszeitung, Nr. 347. S. 2697; Colla, Giorn. Astron. 1853, p. 75.
— 8.	Near Rehhausen and Gersdatt (near Neumburg).	Vibratory shocks.			Dorferzeitung, 1851, Nr. 3. S. 11.

1830. Dec. 28. About 2 P.M.	Coblentz and Neuwied, and the surrounding country.	A shock from N. (N.W.?) to S.E. At Rübenach, six or eight seconds after the explosion there heard, a quick strong shock.	At Rübenach, at the time mentioned, there arose a violent storm, which, however, only lasted a few minutes, and was followed by a loud explosion as of a piece of heavy ordnance. Two days before, the wells at Bubenheim (1½ mile from Coblentz, and ¼ mile from Rübenach) suddenly dried up. On the 26th, at 2 A.M., the river Douro in Portugal, between Roa and Aranda, suddenly lost all its water, which did not return until 10 A.M. A short time before or after this event, quite the same thing happened to the river Alba de Tormes.	Preuss, Staatszeitung, 1831, Nr. 26, Beil. S. 219.
— 29. —	Sulmona and some other places in the Abruzzo, Italy.	Violent shocks		Preuss, Staatszeitung, 1831, Nr. 26, Beil. S. 219.
—	In the island of Amboyna, one of the Moluccas.	A violent earthquake.		Berghaus' Almanach für Freunde der Erdkunde, 1837, S. 224.
1831. Jan. 2. 3 P.M.	Lago-Negro in the Basilicata, kingdom of Naples.	An earthquake of 20 seconds' duration.	Ten houses and a neighbouring church fell	Preuss, Staatszeitung, 1831, Nr. 26. S. 219, Nr. 43, Beil. S. 359.
— (At the same hour?) —	Cajeta in Calabria Citra	A severe shock	Buildings were injured, and masses of rock detached.	Ditto.
— 15. — N.S.	In the government of Nertschinsk in Siberia.	A slight earthquake, lasting about ten seconds. The shock was directed towards the N.E., and was more violent on the N.E. than any other side.	Accompanied by noise like thunder	Ditto, Nr. 112. S. 839.
— 18. —	Messina	Several shocks		Garnier, Météor. p. 96; Colla.
— 28. —	Ditto. Also on this day at Palermo.	Ditto. At Palermo one shock.		Ditto; Poggenдорff's Annalen, B. xxiv. S. 54.
— 29. — Between 10 and 11 P.M.	In the arrondissements of Remiremont and St. Dié, department Voeges.	A severe shock from S.W. to N.E.	At Gérardmer the shock was accompanied by a dull but distinct noise.	Moniteur, 15 Fév.
— Feb. 9. —	Palermo	Another shock		Garnier, Météor. p. 96; Colla; Poggenдорff's Annalen, B. xxiv. S. 54.

1.	2.	3.	4.	5.	6.
1831. Feb 10.	Messina. The centre of disturbance seemed to be at Melazzo (twenty miles to the N.).	More shocks. At Melazzo more than sixty were reckoned.		From the 19th to the 25th the upper crater of Etna was in eruption, after which these shocks diminished in number, but did not cease until after the eruption in the island of Pantestaria in the month of July.	Garnier, <i>Mémoires</i> , p. 96; <i>Pogg. Ann.</i> B. xiv. S. 54; <i>Preuss. Staatszeitung</i> , Nr. 163. S. 1052.
22.	Alpeppo. Mar. 1. Ardvorlich, Killin, and Tyndrum, in Perthshire, Scotland.	A violent earthquake. A shock which came from the N.W.		Accompanied by a sound resembling a sudden gust of wind. Doors and windows were shaken. The night was calm and frosty. The barometer was low, at Inverness the mean height for February was 29.10, the lowest monthly average for the year.	<i>Dorfezeitung</i> , 1831, Nr. 65. D. Milne's Catalogue of British Earthquakes, <i>loc. cit.</i>
8 p.m.	2. Dover, Ramsgate, Margate, and Deal, on S.E. coast of England.	A severe shock			<i>Preuss. Staatszeitung</i> , Nr. 73, Beil. S. 610; <i>Journ. des Débats</i> , 7 Mars; <i>Pérussac, Bull. des Sc. Phys. et Math.</i> Août 1831.
17.	In the island of Bardsey off the S.W. coast of Caernarvonshire.	A shock of an earthquake.		The shock was felt in the lighthouse on the island, and "set the whole building in quick vibration, and filled every one on the island with indescribable alarm." A similar shock had been felt in Bardsey about seventy years before.	J. H. Bransby in the <i>Christian Register</i> , vol. xviii. p. 304.
11 ^h 25 ^m A.M.	26. San Remo in Pignerol (Piedmont).	Severe vertical shocks, and more prolonged oscillations, together lasting fourteen seconds.		Preceded by subterranean noise like the rattling of carriages. A thick mist (cloud of dust?) rose above the roofs of the shaken buildings.	Alb. Nola, del <i>Tremuoto Avvenuto nella città e provincia di S. Remo l'anno 1831</i> . Pignerolo, 8vo. 48 p.
28.	Taggia and Castellaro in Pignerol (Piedmont).	A severe vibratory shock.		Fifty-two houses were thrown down, many others injured, and a bridge cracked. On the plain, and on the western side of the hill fissures opened in the earth.	Ditto.
Apr 2.	In Sicily. Cariati in Calabria Citra	Shocks. A shock, followed by several others.		The town of Melazzo was ruined	Huot, <i>Géologie</i> , p. 117. <i>Göttingische Zeitung</i> , 1831, Nr. 86.
Before the 3rd (when the account was written).	In the southern part of the island of Samos.	Violent shocks.		Followed by the fall of one of the highest mountains opposite Icaria. An enormous mass of water burst forth from the mountain and carried everything before it on its way to the sea. The Constitution of 6 Juillet gives the date.	<i>Preuss. Staatszeitung</i> , Nr. 160. S. 1040.

1831. April 12. At sea, in 0° 22' S. lat., and 23° 27' W. long. Noon.	.....	On board the ship 'l'Aigle,' Capt. J. Taylor, a shock was felt exactly as if the vessel had touched upon a rock.	quake had been felt in the island of Scio. The rudder was greatly agitated, and a dull sound was heard beneath the water. The weather was fine, and the sea calm.	Daussey in the Comptes Rendus de l'Acad. t. vi. p. 514.
— — — — —	Cariati in Calabria Citra	Another shock, much more severe than that of the 2nd. Others succeeded it daily up to the 22nd.	.....	Gothaische Zeitung, Nr. 86.
— — — — — 29. About 5 p.m.	Orleans in France and the neighbourhood.	Several rather severe shocks.	.....	Journ. des Débats, 3 Mai.
— — — — — May 26. 11 ^h 18 ^m A.M.	Genoa, and Porto-Mauricio on the Genoese coast (about twenty-seven miles from Monte Negro). Also felt at Marseilles.	Violent shocks, some of them vertical, and some in a side direction, which succeeded each other within two seconds, and seemed to come from the side of Monte Negro (i. e. E. to W.).	Buildings were thrown down at Castellaro, and Caggia and Bussano also suffered severely.	Gothaische Zeitung, Nr. 101; Journ. des Débats, 8 Juin; Férussac, Bull. des Sc. Nat. t. xxvi. p. 152.
— — — — — 28. 0 ^h 45 ^m or 1 ^h 30 ^m P.M.	Ditto. Not reported as having been felt at Marseilles. Particularly severe at Vintimiglia and Albenga.	Another shock. The motion seemed to be at once horizontal, vertical, and oblique.	.....	Ditto.
— — — — — Day not given. At night.	Odessa	Several shocks, of which one was very violent. Others during the course of the month.	.....	Constitutionnel, 8 Sept.
— — — — — June 28. 5 p.m.	In Sicily, especially at Sciacca. Also felt at Palermo.	Very severe shocks, followed by others up to the 11th of	Several shocks were felt this day on board the ship	Moniteur, 1 Sept., 2 et 28 Oct., 10 Nov.; Garnier, Météor. p. 95; v. Hoff.

1.	2.	3.	4.	5.	6.
1831. July 2. In Sicily, especially at Palermo.		July.	'Brihamia,' Admiral Malcolm, over the place where the new island afterwards appeared.	the island of Pantelaria. For a detailed account of this phenomenon, vide v. Hoff.	
— 13. Parma.		The shocks were very intense at Palermo on this day.			Moniteur, 1 Sept. 2 at 28 Oct., 1831; v. Hoff.
— 14. Ditto.		Several shocks.			Cola.
— Murray Bay in the Gulf of St. Lawrence, Canada. Felt also at Beauport, ninety miles to the south-west, and other places in the vicinity.		Ditto. When the preceding noise appeared to have reached the house (of an observer) a heavy shock was felt, like a sudden blow, succeeded immediately by a rocking motion.	Also felt on board ships in Murray Bay.	Pretended by subterranean noise, which seemed to come from the north (or north-west). The rocking motion produced a feeling of sickness. Chimneys were thrown down and walls injured. Shocks are said to be of rather common occurrence in this district.	Ditto. Geol. Soc. (Lond.) 2nd Series, vol. v. p. 98 (note); Trans. Soc. Quebec, vol. II. p. 83. 89. 1831.
— Aug. 3. Bucharest, Iamaß, Kischineu, and Leow, Wallachia.		Shocks.			Pressa, Staatszeitung, Nr. 347. S. 1398.
— 11. Bridgetown in Barbadoes, and in Jamaica.		Ditto.		During a violent hurricane which raged over the West Indies, especially Antigua, St. Vincent, Dominica, Guadeloupe, and Barbadoes. It lasted from 2½ 30 th A.M. to 5 P.M. Barbadoes suffered at once from the hurricane, the earthquake, and a volcanic eruption. 3000 persons perished altogether.	Ditto, Nr. 235. S. 1898, Nr. 298. S. 1610; Garnier, Meteor. p. 168.
— 14. Resina near Naples.		A shock.		During an eruption of Vesuvius.	Audot, Roy. de Naples, p. 74.
— 27. Besançon in the department of Doubs. And at the same hour at Fribourg in Switzerland.		Two rather violent shocks, with an interval of ten seconds.		Each shock preceded by a dull explosive noise lasting two seconds. Doors, windows, and articles of furniture were shaken. The Pressa, Staatszeitung reports the event as during the night of August 26-27.	Garnier, Meteorologie, p. 169; Mercur, Preuss. Staatszeitung Nr. 250. S. 1410.
— Sept. 11. Parma, Reggio, Modena, Castel-Nuovo, and at same time at thence.		An earthquake at the same time at thence.		At Parma accompanied by a dull noise like thunder.	Colische Zeitung, Nr. 189 u. 198.

30 ^m P.M.	far as Venice.	different places. At Parma violent shocks from N.E. to S.W., which lasted more than eight seconds (minutes according to another account). At Venice they lasted the same time, but the direction was E. to W. Followed by other shocks on the 12th and 13th.	chimnies fell, bells sounded of themselves, clocks were stopped, and the horses and dogs showed great alarm. At Reggio 200 chimnies were thrown down, and the Benizzi palace was in great part ruined. From the 10th the water in the wells of Parma had been troubled.	Colla.
1831. Sept. 30.	Palermo	A shock	On the 21st an eruption of Vesuvius had begun, which continued until the end of the month, and begun again on the 6th or 7th of October, lasted until the 15th of that month, and then gradually ceased.	Poggendorff's Annalen, B. xxiv. S. 54; v. Hoff.
Oct. 8. 9 ^h 30 ^m P.M.	Arica in Peru. Extended towards the south to the most distant extremity of the republic, and towards the north as far as Camana, (therefore over about 7° of lat.). Felt at Chuquisaca, 400 miles inland.	A violent vibratory shock, in a vertical direction, which lasted about seventy seconds. The motion proceeded from S. to N. This principal shock was followed at 11 P.M., and 5 A.M. the next morning, by others, and even as long after as February 7, 1832, a distinct trembling of the earth was felt. In the intermediate time ninety-seven shocks were reckoned.	Also felt at sea at the distance of a hundred miles from Arica. The ships in harbour experienced violent shocks. Preceded by a subterranean hollow rolling noise like distant thunder, but louder. It lasted about ten seconds. Many houses were thrown down, and others injured, the walls cracked, &c. The shocks of later date were unaccompanied by noise. (According to another account scarcely a stone was left upon another in Arica, and a village fifteen leagues to the south was also totally destroyed, but one lying to the north of Arica, although nearer, suffered less.) No earthquake of any consequence had been felt in this region for nearly a century.	Edinburgh New Phil. Journal, April and July 1834; Das Ausland, 1831. Nr. 110. S. 440.
16.	In the Romagna, Italy...	Shocks.....	.....	Antologia di Firenze, 1832, Jun. p. 213.

1.	2.	3.	4.	5.	6.
1831. Oct. 27 Foligno in the States of the Church. to Nov. 7.		Daily shocks during this period. The most violent were on the 7th of November.		Many houses thrown down	Journ. des Débats, 2 Déc.; Garnier, <i>Météorologie</i> , p. 109.
Nov. 17 Swardisjö near Fahlun in Sweden. 6 ^h 15 ^m A.M.		A shock from S. to N.		During a violent storm from the north. The shock was accompanied by a loud explosive noise, which was heard also in the villages of Mornau and Zeuger, and at Fahlun. An extraordinary light appeared in the northern horizon.	The Preuss. Staatszeitung, Nr. 381. S. 1825.
Nov. 19 Neuchâtel and Fribourg In the evening				Perhaps this account only refers to the events of the 20th and 22nd, wrongly reported as to date.	M. Studer's Catalogue.
Nov. 20 Val-de-Travers, Locles, and Neuchâtel 10 P.M.		Two slight shocks			Journ. des Débats, 1 Déc.; Constitutionnel, 19 Déc. Mérian.
Nov. 22 Fribourg in Switzerland 9 ^h 55 ^m P.M.		A severe vibratory shock strong enough to make the houses quiver. Three separate vibrations are said to have been felt, of which the second only was attended with noise.		Accompanied by a very loud rolling noise passing from S. to N., and lasting five or six seconds. On the day of the earthquake, before and after the shocks, and on the day before, a calm prevailed, but the preceding days had been stormy. The Werra was unusually high. According to some accounts, a fireball, apparently as large as the moon, was seen passing towards the west.	Dorchester, Nr. 224. S. 906, Nr. 227. S. 917, Nr. 229. S. 927.
Nov. 29. In and about the Thuringerwald, in the district of the sources of the Werra and Schleusse. Most strongly felt in the higher mountain regions of the Thuringerwald, at Trautenbergwald, Schmiedefeld, and Neustadt; to the north in the bulwark of Gehren and Katzhütte, and on the south along the course of the Werra to Eisfeld and Hilburghausen.					
Nov. 30. In Chili		Shocks			Ditto, Nr. 251. S. 934. Perry's <i>Memoir on Earthquakes</i> .

1831. Nov.	Fornovo, fourteen miles from Parma.	Slight shocks during a period of several days.	.....	.....	Colla.
— Dec. 3. 7 ^h 50 ^m P.M.	In the island of Trinidad. Also felt in St. Christopher's.	A violent earthquake. In Trinidad the first shock lasted nearly three seconds, and was followed by an oscillation perceptible for four to six seconds. After the noise which succeeded this, the second shock occurred, which was much more terrible than the first. At 10 P.M., and at 2 A.M. the next morning, shocks were also felt, but of nothing like the violence of the first.	.....	Followed by a noise like distant thunder. When the second shock occurred the earth seemed to rise and fall like the waves of the sea, and the strongest as well as the slightest buildings quivered to the ground. In the early part of the evening the heat was unbearable, and during the earthquake there was not a breath of wind stirring. Some heavy showers of rain followed.	Ausland, 1832, Nr. 110. S. 440, quoting a journal of Trinidad of the 7th Dec. 1831; Monthly Magazine, 1832, April, p. 169; Leonhard u. Bronn, N. Jahrbuch für Mineralogie, 1833, S. 127.
— 4. 2 ^h 30 ^m (Italian time).	In Piedmont, at Caggia (Taggia?) and Castellarò and in the neighbourhood, where shocks were felt on the 28th of March. The valley separating these two places seemed to be the centre of disturbance.	More shocks	.....	.....	Alb. Nota del Tremuoto Avvenuto nella città e provincia di S. Remo, l'anno 1831.
— 22.	Mount Vesuvius	Violent tremblings	.....	Accompanied by loud detonations	Allgemeine Zeitung, 1832, Nr. 17, Beil. S. 65, Nr. 33, Beil. S. 132.
— 24. in the evening.	Ditto	Another, very violent	.....	Five fissures opened, from which the lava flowed on the morning of the 25th, and continued to flow until January 9, 1832.	Ditto.

1.	2.	3.	4.	5.	6.
1831, Dec. 25. 9 P.M.	Loughat u. Kenyon, in the N.E. of Hindostan; on the southern slope of the western spur of the Himalaya.	An undulatory motion of the earth from N.W. to S.E., lasting seven seconds.			Berliner Spenerische Zeitung, 1837, Nr. 59.
1832, Jan. 1. In one of the earliest hours of the morning.	Resina at the foot of Vesuvius.	An earthquake			Allgemeine Zeitung, Nr. 33, Beil. S. 132.
— 13 After 2 P.M. at Foligno.	Foligno, Bevagna, Perugia, Assisi, Spello, Montefalco, Canara, and in Rome. Most violent at the two first named places. Extended along a line parallel to the Apennines. Felt at Parma.	At Foligno a terrible shock, followed an hour after by a second. At Bevagna the first shock lasted eleven seconds, and was followed by five others. At Rome the shocks were undulatory, and not severe. They recurred at 3 P.M., and at 2 A.M. the following morning. At Foligno the shocks continued at intervals up to the 15th. During the night of 13 to 14, there were 38.		Preceded and followed at Foligno by violent rain mixed with hail. A man going to draw water found the well filled to the brim, and the furrows in the fields full of muddy water (from the rain?). A few minutes after, he felt the first shock. On returning soon after to the well, he found it quite dry; the water also had disappeared from the fields, in which deep cracks were to be seen. Near Bevagna much resinous and sulphurous matter was said to have come out of the earth. Here and at several other places buildings were injured.	Allgemeine Zeitung, Nr. 24, S. 94, Nr. 26, S. 102, Nr. 42, S. 165; Ausland, Nr. 81, S. 324, Nr. 110, S. 440; Journ. des Débats, 31 Janv.; Constitutionnel, 30 et 31 Janv.; Colla.
Night between 17 & 18.	Rome	Another vibratory shock.			Allgemeine Zeitung, Nr. 35, Beil. S. 131.
— 27.	Foligno	Another slight shock.		Preceded by a detonation in the air	Constitutionnel, 25 Fév.
— 29.	Trevi, six miles from Foligno.	A shock		Caused much damage	Ausland, Nr. 110, S. 449.
Feb. 1. About noon and 10 P.M.	In the Haute Engadine, Switzerland.	Shocks at the hours mentioned.			Mérid.

1832. Feb. 16. Sciacca in Sicily 4 A.M.	A slight shock.....	.....	At the same time vapour was seen to rise from the sea in the same place where the new island had made its appearance in the preceding July. On this day Vesuvius, which had remained quiet since the beginning of the year, began to send forth smoke, and on the 20th an eruption of stones, lava, &c. commenced, which continued more or less (with slight tremblings) up to the end of March, and slightly till the end of July, when a great eruption occurred.	Ditto; Audot, Roy. de Naples, p. 74.
— — — 21. Pozzuoli near Vesuvius.....	Slight shocks .....	.....	.....	Allgemeine Zeitung, Nr. 52, Beil. S. 297.
— — — ... In Umbria	Constant oscillations during the whole month.....	.....	.....	Trans. Geol. Soc. (London) 2nd series, vol. iii. pp. 492. 494.
— — — ... Lahore, the valley of Badakhshan, and other parts of North-western India.	.....	.....	Huge masses of rock were thrown down in many places from the cliffs.	
— — — March 8. In Calabria Ulteriore and a small part of Calabria Citeriore. Principally on the east of the Apennines, at S. Severino, Cotrone, Isola, Cutro, Policastro, Caltanzaro, Roccabernardo, Roccafineto, Scandale, S. Mauro, Castello, and Ciro; also slightly in some places to the west of the mountains, especially at Monteleone and Reggio. In Calabria Citeriore the earthquake was felt at Cosenza. At Naples two or three slight shocks were felt.	A violent and destructive earthquake. The first, vibratory, shock was the most violent, in the direction S.E. to N.W., and lasted 11 seconds. The shocks recurred not only during the following night, but more slightly up to the 16th.	.....	Cutro was completely destroyed, and great damage done in other places, especially at Soveria in the district of Caltanzaro. On the 7th a luminous meteor was observed at Potenza, which lasted nearly a minute, and was followed by an explosion like that of a cannon.	Allgemeine Zeitung, Nr. 86, Beil. S. 343, Nr. 87. S. 347, Nr. 99, Beil. S. 393, Nr. 100, Beil. S. 397; Audot, Roy. de Naples, p. 74; Constitutionnel, 24 Mars, 18 Avril.

1.	2.	3.	4.	5.	6.
1852, Mar. 11, 12, 13, 14, and 15.	Assise, La Bastia, La Cannara, Catanzaro, Cotrone, Monte- Leone, Reggio, Milan, Mantua, Verona, Reg- gio (in Modena), Ge- nova, and Parma.	Violent and repeated shocks. At Milan, Mantua, Verona, Reggio, and Genoa, they were felt from the 11th to the 13th, and at Parma daily from the 11th to the 17th. At the latter place they were in the direc- tion of the magne- tic meridian. At Giornico, Bellin- zone, and Lugano, on the 13th, after 3 P.M.		La Bastia and La Cannara were completely ruined, and at many other places great damage was done. At the time of the shocks of the 14th and 15th the waters of the lake of Desirna in Russia were extraordinarily disturbed, and a noise was heard like that of a storm.	Journ. des D�bats, 3 et 29 Avril; Constitutionnel, 28 Mars, 2 et 18 Avril, 2 Mai; Colla, Allgemeine Zeitung, Nr. 86, Beil. S. 843, Nr. 91, Beil. S. 362; Antologia, 1852, Jun. p. 311; Communication of M. M�rian to M. Perrey.
— 19. Parma .. — 21. Ditto .. — 22. Reggio in Calabria .. — 28. Parma .. — 31. Irkutsk in Siberia .. 7 A.M.	More shocks .. Ditto .. Destructive shocks .. More shocks .. A rather severe earth- quake. The first shock lasted nearly a minute, and was scarcely percepti- ble, but the second, which occurred 4 minutes later, made everything in the houses shake vio- lently.			Ditto. Ditto. The ducal palace was violently shaken. Ditto. Neither of the shocks was accompanied by any subterranean noise.	
— April. beginning of the month. — 11. 9 A.M.	Catanzaro in Calabria .. Kischta in Siberia .. Parma ..	More shocks, of great violence. A rather severe shock, lasting 45 seconds. Several shocks.		New ruins produced .. Moniteur, 3 Sept.	Authorities for March 11.

1832. Apr. 14. Tiflis in Georgia (N. S.) 3 A.M.	Two distinct shocks, followed by others at 4 ^h 52 ^m A.M. and at 3 ^h and 3 ^h 10 ^m P.M.	Accompanied by a noise as if the houses were falling. M. Vichmann observed three shocks at Tiflis in 1832-33.	Memoir on Earthquakes in the Caucasus, by M. Philadelphine, Professor of Physics at Tiflis, translated by M. Kuppfer; Dubois de Montpéreux, Voyage autour du Caucase, t. iii. p. 271. Authorities for March 11. Ditto.
— 19. Parma — 22. Ditto — In the In Nova Scotia middle of the year.	Several shocks Ditto A slight shock.....	..... ..... .....	Galignani's Messenger, 16th Oct., quoting from a series of Montreal journals, the date of the last of which was 13th Sept.
— July 2. Lohugbat in Kemaon, Hindostan. 11 P.M.	The earth shook for 12 secs.	Accompanied by a sound like that of rushing water, which lasted three seconds before the shock, and as long after it.	Berliner Spensersche Zeitung, 1837, Nr. 59.
— 20. Lisbon 6 A.M.	A severe shock, lasting about 10 secs.	Cracks appeared in some of the walls, and people were violently shaken in their beds. On the morning of the 15th of this month an extraordinary flux and reflux of the sea was observed at Dantzig, supposed by some to be caused by an earthquake. On the 23rd a tremendous eruption of Vesuvius began, which did not cease until the 16th August, and was followed on the 16th September by another of less energy.	Allgemeine Zeitung, Nr. 221. S. 881; Dorfzeitung, Nr. 111. S. 562; v. Hoff.
— ... Cotrone in Calabria ...	Repeated shocks.....	.....	Allgemeine Zeitung, ausserord. Beil. Nr. 345. S. 1379.
— Aug. 2. Tiflis in Georgia .....	.....	.....	Plieninger, Jahrsbericht über die Witterungs-Verhältnisse in Würtemberg.
— 7 Vesuvius and the neighbourhood. and 10.	Severe and frequent shocks, particularly on these two days.	Accompanying the violent eruption of the volcano, which still continued. Remarkable atmospheric disturbances.	Journ. des Débats, 2 Sept. Bibl. Univ. Avril 1833, p. 350; Archives des Découv. 1832, p. 244; v. Hoff.
— 18. Lohugbat in Kemaon, Hindostan. 7 A.M.	Another vibratory shock, of 5 secs. duration.	The weather was hot and sultry	Berliner Spensersche Zeitung, 1837, Nr. 59.
— 31. Langhiramo, Castrignano, and neighbourhood; in Italy (what State?). Also felt at Berceto.	Slight shocks, more severe at Monchio-di-Sasso, Campora, and Scurano.	.....	Colla.

1.	2.	3.	4.	5.	6.
1832. Sept. Night between 3 and 4.	Pottiers in France	A rather severe shock, lasting some sect.			Monteur, 9 Sept.
— 23 10 P.M.	Lohngat in Kemron, Hindostan.	Another earthquake, as on the 2nd July.			Berliner Speersche Zeitung, 1837, Nr. 59.
— Oct. 18 or 19, 2 P.M.	In many parts of the kingdom of Saxony, especially in the dis- tricts on the Pleisse and Milde to the Elbe near Dessau. Most distinctly felt at Gross-Hernsdorf in the hallwick of Borna, west of the Pleisse, and at the quarries of Rochlitz in the valley of the Zwickau Mulde.	A vibratory shock. At Dessau it was like the explosion of a mass of powder.		At Gross-Hernsdorf and the quarries of Roch- litz, accompanied by loud subterranean thun- der. The upper mist in the air suddenly dis- appeared after the earthquake, and the air be- came mild.	Allgemeine Zeitung, ausserord. Beil. Nr. 464. S. 1855; Leipziger Zei- tung, Nr. 256; Kastner's Archiv, B. vi. S. 301 u. 309.
— 31.	On and around Etna ...	Several slight shocks.		In the forests of Adarno di Bronte and Maletto the shocks were so severe that houses were injured. On this day a great eruption of Etna, the first since 1819, began, which did not cease until December.	Leonhard u. Braun, N. Jahrbuch, 1833. S. 641.
— Nov. 5.	Ditto. Felt even at Ca- tania.	The earth trembled violently.		Accompanied by tremendous explosions, and a revival of the eruption.	Ditto.
— 13.	Zeiz in Saxony	A vibratory shock ...		In Dessau, on the evening of this day, there was a thick yellowish fog with a perceptible odour. Accompanied by tremendous explosions. At Nicolosi great damage was done. Preceded and followed by heavy rain. Garnier gives the date Dec. 24.	Kastner's Archiv, B. vi. S. 309.
— 21. 10 ^h 30 ^m A.M.	On and around Etna ...	A terrible shock. Ten minutes after there followed another, of less violence.			Leonhard u. Braun, N. Jahrbuch, 1833, S. 641.
— 25.	Ditto	Another shock. In the little village of Milo, 18 miles from Catania, se- vere shocks were felt daily on the		Accompanied by subterranean noise as before. A tower, before injured by the earthquake of 1818, was so severely shaken, that three days afterwards it fell.	Ditto.

1832. Nov. 29. 10 A.M.	Nischneitagilsk in the Oural. Most violent in the district of the platina washings.	An earthquake. The motion appeared to go from S.W. to N.E., or nearly parallel to the chain of the Oural.	.....	Accompanied at the platina washings by loud noise like thunder, which lasted several seconds. A violent storm at the same time.	.....	Gothaische Zeitung, 1833, Nr. 43.
— Day not given. 11 P.M.	At sea, in 0° 22' S. lat., and 21° 15' W. long. (from Paris).	.....	On board the ship 'La Seine,' Captain Le Marié, a shock was felt, so severe that it was supposed that the vessel had touched upon a shoal.	.....	Daussy in the Comptes Rendus de l'Acad. t. vi. p. 514.	
— Dec. 6.	In Bessarabia .....	.....	.....	.....	Plieninger, Jahrsbericht über die Witterungs-Verhältnisse in Würtemberg.	
— 10.	Ditto .....	.....	.....	.....	Ditto.	
— 14.	In Saxony .....	.....	.....	.....	Ditto.	
— 17. 9 P.M.	Compiano in the duchy of Parma, and the neighbourhood.	Two perceptible shocks, followed by a third about midnight.	.....	.....	Colla.	
— 18. 4 or 5 A.M.	Ditto	Three more shocks, one of which was severe and of long duration.	.....	No damage done. On the 16th an eruption of Vesuvius began, which continued until the 24th.	.....	Ditto; v. Hoff.
— 30. 8 ^h 20 ^m P.M.	Swansea in S. Wales ...	Four shocks, from S.W. by W. to N.E. by E. Altogether lasted a second and a half.	.....	.....	.....	Gentleman's Magazine, vol. cii. pt. 2. p. 640.
— 31. In the morning.	Swansea, Neath, Llan-dover, Caermarthen, and other places in S. Wales; and at Castle-bridge, Co. Wexford, Ireland.	.....	.....	Can this account refer to a different event from the one last recorded?	.....	The Spectator, No. 237. Jan. 12, 1833.
— 1833. Jan. 5. before 11 P.M.	Huasco in Chili, South America.	.....	.....	.....	.....	Phil. Trans. 1836, p. 21.
	Solenure in Switzerland.	.....	.....	.....	.....	Mérian.

1.	2.	3.	4.	5.	6.
1833, Jan. 11. 1 st 30 ^m A.M.	Loybach in Carnutha ...	Two violent shocks, lasting two seconds and a half.			Garnier, <i>Météorologie</i> , p. 170.
— 13	Linköping in Sweden.	Two shocks, which lasted about 10 seconds.			Ditto.
— 14.	In Saxony (in the original erroneously Switzerland.), at Macher, Brands, Puchace, and other adjoining villages in the neighbourhood of I.e. 1725.	An earthquake, which consisted of a severe shock from S. to S.W. (?), lasting nearly 2 seconds.			Ditto, p. 171.
Between 10 ^h 30 ^m and 10 ^h 45 ^m A.M.					
Feb. 5. 5. Some minutes past 5 A.M.	Noirmoutiers in the department. Charente.	Two shocks. The first was the most severe, and lasted 6 or 7 seconds. It was followed 7 or 8 seconds later by the second.	The second shock, reacting on the sea, communicated a perceptible motion to the vessels.	The first shock was taken for the passage of a carriage on the pavement. The subterranean noise passed from S. to N.	Ditto; Journ. des Dôlats, 13 Fév.
— 7. 0 ^h 30 ^m A.M.	In the West Indies	A slight shock.			L'Institut, 29 Juin; Garnier, p. 172.
— 8. 1 st 30 ^m A.M.	Island of Antigua	Lasted nearly 30 seconds.			Annual Register, 1833, p. 71.
— 9. 1 st 30 ^m A.M.	In the West Indies	A moderate shock			L'Institut, 29 Juin; Garnier, p. 172.
— 10. 3 rd 45 ^m P.M.	Ditto ..	Two severe shocks			Ditto.
— 11. 2 nd 30 ^m A.M.					
— 12. 3 rd 28 ^m A.M.	Friedrichshafen on the Lake of Constance, and neighbourhood. Also (3 rd 30 ^m) at Bl.	A shock		Accompanied by a rolling noise	Mérian; Pflenzinger, <i>Jahresbericht über die Witterungs-Verhältnisse in Württemberg</i> .

1833. Mar. 20.	Würtemberg?). Glengarry, Invernesshire.	.....	.....	The door of an inn was lifted off the latch	D. Milne's Catalogue of British Earthquakes, <i>loc. cit.</i> L'Institut, 29 Juin; Garnier, p. 172.]
— 23. 10 ^h 30 ^m P.M.	In the West Indies	Another shock .....	.....	.....
— 24. 9 ^h 15 ^m P.M.	Parma	A slight undulatory shock from S.E. to N.W., followed, 7 minutes after, by a second, in the same direction and lasting 4 secs.	.....	The atmosphere was calm, and the sky obscured by clouds, some of which were very much elongated. A gust of wind of considerable force had preceded the shock by a few minutes, and caused the thermometer to rise 1° R.	Colla.
— and April.	Murray Bay and other places on the shores of the Gulf of St. Lawrence.	Very many shocks during these two months.	.....	.....	Trans. Geol. Soc. (London) 2nd series, vol. v. p. 98, note.
— April. About the 2nd (taken from a London letter of the 10th), 8 ^h 15 ^m P.M.	Horsham in Sussex ...	A shock of earthquake .....	.....	More perceptible in some houses than in others. Some persons were greatly frightened, while others felt nothing.	Garnier, p. 171.
— 4. 4 ^h 18 ^m A.M.	Vicenza in Italy	A severe shock, preceded at about 1 ^h 15 ^m by a slighter one. Both were undulatory.	.....	The bell of the great tower sounded of itself ...	Ditto.
— 6. About 10 ^h 30 ^m P.M.	At Algiers	A shock which lasted three seconds.	.....	.....	Ditto.
— 7. 3 A.M.	Ditto	Another shock, stronger than the last.	.....	.....	Ditto.
— 15. 9 ^h 45 ^m P.M.	In the West Indies. The island of St. Christopher's is specified.	Rather a severe shock. Lasted some seconds, and was followed by several others of less violence.	.....	.....	L'Institut, 29 Juin; Garnier, p. 172; Annual Register, 1833, p. 71.

1.	2.	3.	4.	5.	6.
1832, Mar. 11, 12, 13, 14, and 15.	Assise, La Bastia, La Cannara, Catanzaro, Corone, Monteleone, Reggio, Milan, Mantua, Verona, Reg- gio (in Modena), Ge- nova, and Parma.	Violent and repeated shocks. At Milan, Mantua, Verona, Reggio, and Genoa, they were felt from the 11th to the 13th, and at Parma daily from the 11th to the 17th. At the latter place they were in the direc- tion of the magne- tic meridian. At Giornico, Bellin- zone, and Lugano, on the 13th, after 3 p.m.		La Bastia and La Cannara were completely ruined, and at many other places great damage was done. At the time of the shocks of the 14th and 15th the waters of the lake of Dairma in Russia were extraordinarily disturbed, and a noise was heard like that of a storm.	Journ. des Débats, 3 et 29 Avril; Constitutionnel, 28 Mars, 2 et 18 Avril, 2 Mai; Colla; Allgemeine Zeitung, Nr. 86, Beil. S. 343, Nr. 91, Beil. S. 362; Antologia, 1832, Jun. p. 311; Communication of M. Mérian to M. Ferrey.
— 19. Parma .. — 21 Ditto .. — 22 Reggio in Calabria .. — 28 Parma .. — 31 Irkutsk in Siberia .. 7 A.M.	Parma .. Ditto .. Reggio in Calabria .. Parma .. Irkutsk in Siberia ..	More shocks .. Ditto .. Dreadful shocks .. More shocks .. A rather severe earth- quake. The first shock lasted nearly a minute, and was scarcely percepti- ble, but the second, which occurred 4 minutes later, made everything in the houses shake vio- lently.			Ditto. Ditto. Ditto. Ditto. Neither of the shocks was accompanied by any Constitutionnel, 23 Jun.
— April. Beginning of the month. — 11. 8 A.M.	Catanzaro in Calabria .. Kiachita in Siberia ..	More shocks, of great violence. A rather severe shock, lasting 45 seconds.		New ruins produced .. Moniteur, 3 Sept.	Authorities for March 11. Moniteur, 3 Sept.
— 12. Parma ..	Parma ..	Several shocks ..			Authorities for March 11.

1832. Apr. 14. Tiflis in Georgia (N. S.) 3 A.M.	Two distinct shocks, followed by others at 4 ^h 52 ^m A.M. and at 3 ^h and 3 ^h 10 ^m P.M.	Accompanied by a noise as if the houses were falling. M. Vichmann observed three shocks at Tiflis in 1832-33.	Memoir on Earthquakes in the Caucasus, by M. Philadelphine, Professor of Physics at Tiflis, translated by M. Kuppfer; Dubois de Montpéroux, Voyage autour du Caucase, t. iii. p. 271. Authorities for March 11. Ditto.
— 19. Parma — 22. Ditto — In the middle of the year. In Nova Scotia	Several shocks Ditto A slight shock.....		Galignani's Messenger, 16th Oct., quoting from a series of Montreal journals, the date of the last of which was 13th Sept.
— July 2. Lohugbat in Kemaon, Hindostan. 11 P.M.	The earth shook for 12 secs.	Accompanied by a sound like that of rushing water, which lasted three seconds before the shock, and as long after it.	Berliner Spenersche Zeitung, 1837, Nr. 59.
— 20. Lisbon 6 A.M.	A severe shock, lasting about 10 secs.	Cracks appeared in some of the walls, and people were violently shaken in their beds. On the morning of the 15th of this month an extraordinary flux and reflux of the sea was observed at Dantzig, supposed by some to be caused by an earthquake. On the 23rd a tremendous eruption of Vesuvius began, which did not cease until the 16th August, and was followed on the 16th September by another of less energy.	Allgemeine Zeitung, Nr. 221. S. 881; Dorfzeitung, Nr. 111. S. 562; v. Hoff.
— ... Cotrone in Calabria ...	Repeated shocks.....		Allgemeine Zeitung, ausserord. Beil. Nr. 345. S. 1379.
— Aug. 2. Tiflis in Georgia			Plieninger, Jahrsbericht über die Witterungs-Verhältnisse in Würtemberg.
— and 10. — 7 Vesuvius and the neighbourhood.	Severe and frequent shocks, particularly on these two days.	Accompanying the violent eruption of the volcano, which still continued. Remarkable atmospheric disturbances.	Journ. des Débats, 2 Sept. Bibl. Univ. Avril 1833, p. 350; Archives des Découv. 1832, p. 244; v. Hoff.
— 18. Lohugbat in Kemaon, Hindostan. 7 A.M.	Another vibratory shock, of 5 secs. duration.	The weather was hot and sultry	Berliner Spenersche Zeitung, 1837, Nr. 59.
— 31. Langhiramo, Castrignano, and neighbourhood; in Italy (what State?). Also felt at Berceto. About 1 ^h 45 ^m A.M.	Slight shocks, more severe at Monchio-di-Sasso, Campora, and Scurano.		Colla.

1.	2.	3.	4.	5.	6.
2. Sept. at between and 4.	Potters in France	A rather severe shock lasting some secs.			Moniteur, 9 Sept.
— 23. 0 P.M.	Lothar in Kemnath. Another earthquake. Hindostan.	as on the 2nd July.			Berliner Spenerische Zeitung, 1837, Nr. 59.
— Oct. 18 19. 2 P.M.	In many parts of the A vibratory shock. At kingdom of Saxony, Dessau it was like especially in the d. the explosion of a stricts on the Pleisse mass of powder. and Mulde to the Elbe near Dessau. Most distinctly felt at Gross-Hernsdorf in the hallwick of Borna, west of the Pleisse, and at the quarries of Rochlitz in the valley of the Zwickau Mulde.			At Gross-Hernsdorf and the quarries of Roch- litz, accompanied by loud subterranean thun- der. The upper mist in the air suddenly dis- appeared after the earthquake, and the air be- came mild.	Allgemeine Zeitung, ausserord. Beil. Nr. 464. S. 1855; Leipziger Zei- tung, Nr. 256; Kastner's Archiv, B. v. S. 301 u. 309.
— 31.	On and around Etna ...	Several slight shocks.		In the forests of Aderno di Bronte and Maletto the shocks were so severe that houses were injured. On this day a great eruption of Etna, the first since 1819, began, which did not cease until December. Accompanied by tremendous explosions, and a revival of the eruption.	Leonhard u. Bronn, N. Jahrbuch, 1833, S. 641.
— Nov. 5.	Ditto. Felt even at Ca- tania.	The earth trembled violently.		In Dessau, on the evening of this day, there was a thick yellowish fog with a perceptible odour. Accompanied by tremendous explosions. At Nicolas great damage was done. Preceded and followed by heavy rain. Garner gives the date Dec. 24.	Kastner's Archiv, B. v. S. 309.
— 13.	Zeiz in Saxony	A vibratory shock ...			Leonhard u. Bronn, N. Jahrbuch, 1833, S. 641.
— 24. A 30 th A.M.	On and around Etna ...	A terrible shock. Ten minutes after there followed another, of less violence.			
— 25.	Ditto	Another shock. In the little village of Milo, 18 miles from Catania, se- vere shocks were felt daily up to the			

1832. Nov. 29. 10 A.M.	Nischneitagilsk in the Oural. Most violent in the district of the platina washings.	An earthquake. The motion appeared to go from S.W. to N.E., or nearly parallel to the chain of the Oural.	.....	Accompanied at the platina washings by loud noise like thunder, which lasted several seconds. A violent storm at the same time.	
— — — Day not given. 11 P.M.	At sea, in 0° 22' S. lat., and 21° 15' W. long. (from Paris).	On board the ship 'La Seine,' Captain Le Marié, a shock was felt, so severe that it was supposed that the vessel had touched upon a shoal.	.....	.....	Daussey in the Comptes Rendus de l'Acad. t. vi. p. 514.
— Dec. 6.	In Bessarabia .....	.....	.....	.....	Plieninger, Jahrsbericht über die Witterungs-Verhältnisse in Würtemberg.
— — — 10.	Ditto .....	.....	.....	.....	Ditto.
— — — 14.	In Saxony .....	.....	.....	.....	Ditto.
— — — 17. 9 P.M.	Compiano in the duchy of Parma, and the neighbourhood.	Two perceptible shocks, followed by a third about midnight.	.....	.....	Colla.
— — — 18. 4 or 5 A.M.	Ditto	Three more shocks, one of which was severe and of long duration.	.....	No damage done. On the 16th an eruption of Vesuvius began, which continued until the 24th.	
— — — 30. 8 ^h 20 ^m P.M.	Swansea in S. Wales ...	Four shocks, from S.W. by W. to N.E. by E. Altogether lasted a second and a half.	.....	Preceded by a noise like the distant firing of heavy artillery. This sound was heard two or three seconds before the shock.	Gentleman's Magazine, vol. cii. pt. 2. p. 640.
— — — 31. In the morning.	Swansea, Neath, Llan-dover, Caermarthen, and other places in S. Wales; and at Castlebridge, Co. Wexford, Ireland.	.....	.....	Can this account refer to a different event from the one last recorded?	The Spectator, No. 237. Jan. 12, 1833.
— — —	Huasco in Chili, South America.	.....	.....	.....	Phil. Trans. 1836, p. 21.
1833. Jan. 5. before 11 P.M.	Soleure in Switzerland.	.....	.....	.....	Mérian.

1.	2.	3.	4.	5.	6.
3. Jan. 11. 5 ³⁰ A.M.	Laybach in Carinthia.	Two violent shocks, lasting two seconds and a half.			Garnier, <i>Météorologie</i> , p. 170.
— 13.	Länkeping in Sweden.	Two shocks, which lasted about 10 seconds.		The following night, near the bridge of Montala, the water of the river ceased to flow and was raised up into a kind of sea. The bed of the river could be passed dryshod, although in general 60,000 tons of water pass under this bridge per minute. The phenomenon was supposed to be connected with the earthquake.	Ditto.
— 14.	In Saxony (in the original erroneously Switzerland) at Maderbach, Brandis, Pücheln, and other adjoining villages in the neighbourhood of Leipzig.	An earthquake, which consisted of a severe shock from S. to S.W., lasting nearly 2 seconds.		The shock was accompanied by a dull explosion like a blast in a stone quarry, followed by a rolling as of distant thunder, or like the noise of a carriage.	Ditto, p. 171.
— Feb. 5. no minutes at 5 A.M.	Normontiers in the department of Charente.	Two shocks. The first was the most severe, and lasted 6 or 7 seconds. It was followed 7 or 8 seconds later by the second.	The second shock, resulting from the passage of a carriage on the pavement. The subterranean noise passed from S. to N.		Ditto; <i>Journ. des Débats</i> , 13 Fév.
— 7. 30 ⁰⁰ A.M.	In the West Indies.	A slight shock.			L'Institut, 29 Juin; Garnier, p. 172.
— 8. at night.	Island of Antigua.	Lasted nearly 30 seconds.			Annual Register, 1833, p. 71.
— 10. 45 ⁰⁰ P.M.	In the West Indies.	A moderate shock.		In all probability this refers to the same event as that last mentioned.	L'Institut, 29 Juin; Garnier, p. 172.
— 14. 30 ⁰⁰ A.M.	Ditto.	Two severe shocks.			Ditto.
— 27. 28 ⁰⁰ A.M.	Friedrichshafen on the Lake of Constance, and neighbourhood. Also (3 rd 30 ⁰⁰) at Biberach, Schnebren.	A shock.		Accompanied by a rolling noise.	Mérian; <i>Jahresbericht über die Witterungs-Verhältnisse in Württemberg</i> .

1833. Mar. 20.	Würtemberg?). Glengarry, Inverness-shire.	.....	.....	The door of an inn was lifted off the latch	D. Milne's Catalogue of British Earthquakes, <i>loc. cit.</i> L'Institut, 29 Juin; Garnier, p. 172.]
— 23. 10 ^h 30 ^m P.M.	In the West Indies .....	.....	.....	.....	.....
— 24. 9 ^h 15 ^m P.M.	Parma .....	.....	.....	The atmosphere was calm, and the sky obscured by clouds, some of which were very much elongated. A gust of wind of considerable force had preceded the shock by a few minutes, and caused the thermometer to rise 1° R.	Colla.
— and April.	Murray Bay and other places on the shores of the Gulf of St. Lawrence.	.....	.....	.....	Trans. Geol. Soc. (London) 2nd series, vol. v. p. 98, note.
— April. About the 2nd (taken from a London letter of the 10th), 8 ^h 15 ^m P.M.	Horsham in Sussex .....	.....	.....	More perceptible in some houses than in others. Some persons were greatly frightened, while others felt nothing.	Garnier, p. 171.
— 4. 4 ^h 18 ^m A.M.	Vicenza in Italy .....	.....	.....	The bell of the great tower sounded of itself ...	Ditto.
— About 10 ^h 30 ^m P.M.	6. At Algiers .....	.....	.....	.....	Ditto.
— 3 A.M.	7. Ditto .....	.....	.....	.....	Ditto.
— 15. 9 ^h 45 ^m P.M.	In the West Indies. The island of St. Christopher's is specified.	.....	.....	.....	L'Institut, 29 Juin; Garnier, p. 172; Annual Register, 1833, p. 71.

1.	2.	3.	4.	5.	6.
1833 Apr. 17 0 ^h 30 ^m A.M.	Cartagena, Orihue- la, Almoradi, and Torre- vieja in Spain, and at some points of the coast of Africa, oppo- site to Carthagena.	Three rather severe vibratory shocks.		In Murcia, especially at Torrevieja and Almoradi, earthquake shocks had not ceased to be occa- sionally felt since 1829.	Garnier, p. 172.
— 25 About 10 ^h 30 ^m A.M.	Huasco in the province of Coquimbo, Chili, between the 28th and 29th degrees of S. lat.	A violent earthquake. A second shock fol- lowed, but after what interval is not said.		A large part of the houses in this district were thrown down, and the rest greatly injured. The second shock completed the destruction of the church, which had been much injured by the first.	Ditto.
— May 4, 11 P.M.	In the West Indies.....	A slight shock, but of considerable dura- tion.		Preceded by great drought	Ditto; L'Institut, 29 Juin.
— 21, 2 P.M.	Frascati, and Monte Poz- zio in the environs of Rome.	A shock of earthquake		No damage done.....	Garnier, p. 172.
— June 11, 7 A.M.	North of Manchester .. Confreville, Callot, An- gerville, Bayeu, Saint- Maclo, Lamerville, and other communes in the canton of Gode- ville, arrondissement of Havre, departm. Seine-Inférieure.	Violent shocks, which lasted but a few seconds, alarmed the inhabitants.			D. Mine's Catalogue, <i>loc. cit.</i> Journ. des Débats, 2 Juillet; Gar- nier, p. 172.
— July 5, 1 ^h 10 ^m A.M.	Parma	A slight undulatory shock, from E. to W.			Colla.
— Aug. 12 and 13	Vesuvius	Some shocks		Accompanying an eruption of the volcano	Journ. des Débats, 3 Sept.
— 23 About noon	Utrecht in Holland	A slight shock.....			Garnier, p. 173.
— 26 5 ^h 30 ^m or 6 P.M., and again at 11 and 12, the latter being the most vio-	Calecutta, Agra, Luck- now, Tirhoot, Pur- neah, Patna, Buxar, Allahabad, Monghyr, Katmandu, &c.; in fact all over the cen- tre and east of northern	A violent earthquake. At Calcutta there were three shocks, at Lucknow four, at Purneah three, and at each of the other places men-		Water was in many places thrown out of the tanks, as at Tirhoot from a tank of 4 feet deep, in which the surface of the water was 3 feet below the edge. Birds were thrown out of their nests, cattle were greatly frightened, and men could scarcely keep their feet. At Buxar	Asiatic Journal, N. S. vol. xiii. pt. 2. pp. 156 & 155.

side of the river, and but very little on the other. Accompanied in many places by loud subterranean noises, especially at Katmandu, where the most violent shock (at 11 P.M.) was attended by a noise compared to that of 100 pieces of artillery. Here also (at Katmandu) the trees and even the smallest shrubs waved in the air from their very roots. Above 100 houses were levelled in a moment, and at other places still greater loss of buildings and life occurred. At Chupra a chasm opened in the earth of considerable length and depth. Preceded by very close and oppressive weather, and followed in several places by wind and rain.

tioned, several shocks of great violence, besides numerous slighter ones. The most violent were those at the hours mentioned, but the slighter ones continued to recur at intervals until the following October, some of the shocks during that time being rather severe. Each of the shocks lasted but a short time, generally 3 or 4 secs., but some are mentioned of a minute's duration. At Tirhoot the motion was from E. to W., at Buxar apparently from N. to S., at Patna apparently from E. to W., at Calcutta from N.E. to S.W., at Katmandu in Nepal apparently from E. to W. All the shocks came from E. or N.E. At Katmandu the motion lasted about forty seconds. At Purneah the direction is given as S. to E. At most of the places the earth

India, especially in Nepal. Also felt at Lassa.

lent. The time of the principal shock for several of the places was as follows, reducing to Calcutta time:—
At Calcutta (the second shock), 11^h 34^m 48^s. At Katmandu, 10^h 57^m. At Rungpur, 11^h 18^m. At Monghyr, 11^h 34^m. At Arrah, 11^h 29^m. In the Rotas Hills, 11^h 30^m. At Gorackpur, 11^h 39^m. At Allahabad, 11^h 28^m. At Bankura (Rampoora?), 11^h 34^m.

1.	2.	3.	4.	5.	6.
1833. Sept. 18. Chichester, Hardham, and Liphook, in Dorsetshire.		<p>was in almost continual agitation for twenty-four hours. The shock produced a tremor, followed by an undulation. To a person in an old cottage it resembled the sudden turning of a powerful steam-engine or thrashing machine. In solid buildings it was like the fall of a weighty body, followed by a prolonged undulation.</p>	<p>The shock was felt in a boat in Chichester harbour, as if it had struck a rock.</p>	<p>Preceded by the sound of a rising wind. Barometer 29.25 in. The air was very sultry, warm, and still. Wind from S. and S.W. On the previous evening a brilliant aurora, with meteors falling. Pheasants crowded.</p>	D. Milne's Catalogue, loc. cit.
Arica and Saena in Peru. An earthquake				<p>The danger was announced by the baying of dogs and baying of asses. The day before, the atmosphere had been frightfully still and stagnant. With the exception of some puffs of wind at rare intervals, which were felt as well in the interior of apartments as without, the air on the 18th was completely still at Saena. The shocks left a great number of empty bottles standing in the places which they had occupied, but their corks were found strewn on all sides upon the floor. None of the empty bottles were thrown down, but fell ones, on the contrary, were thrown off their shelves and broken. The varnish on a new table recovered its fluidity so far that the next day the table was surrounded by viscid drops. A large part of the water contained in some jars buried in the ground was thrown out, although the surface of the water was 3 or 4 ft. below the rim of the jars. It was remarked that after a shock, whether great or slight, the dogs of the town pro-</p>	

1833. Sept. 20. Meerut in Bengal	The only remarkable shock since that of the 26th of August. Lasted about fifteen seconds.	.....	.....	Asiatic Journal, N. S. vol. xiii. pt. 2. p. 159.
Oct. 4. Monghyr and Jionpoor 7 or 8 ^h 30 ^m A.M. in Bengal.	At Monghyr the shock was very violent and lasted a minute and a half. At Jionpoor it was sudden and smart, lasting only a few seconds. Rather a severe shock.	.....	.....	Ditto, p. 241.
9. Issoire in the departm. 1 ^h 15 ^m P.M. Puy-de-Dôme.	Several more shocks. They were frequent in Auvergne, at Cantal, and in the Haute-Loire, from the 8th to the 22nd. That of the 18th extended as far as Roanne.	.....	Accompanied by noise. The weather, which before looked stormy, then cleared up. Accompanied by an indistinct bellowing noise at Clermont, Issoire, and the neighbourhood. It was remarked that these shocks in Auvergne did not extend beyond the mountain chain of the Puy-de-Dôme, and that they had been preceded by two years of great drought.	Journ. des Débats, 15 et 26 Oct.; France Pittoresque, t. iii. p. 3. Ditto; Annales de l'Auvergne, 1833.
15. Ditto .....	.....	.....	.....	.....
18. Goruckpoor in Bengal... 4 ^h 40 ^m A.M.	Very violent shock, apparently from E. to W. Lasted nearly a minute.	.....	.....	Asiatic Journal, N. S. vol. xiii. pt. 2. p. 241.
24. Singapore 8 ^h 35 ^m P.M.	First a slight shock, then a tremulous motion of the earth which lasted about a minute, and then two other shocks still slighter than the first.	.....	.....	Ditto, vol. xiv. pt. 2. p. 21.
Nov. 13. Chichester in Dorsetshire. 2 ^h 40 ^m A.M.	The shock consisted of a number of undulations rapidly succeeding each other. Followed by another and much	.....	Preceded by a distinct low sound. On the previous day there had been a thick fog, which came from the east and continued up to 9 A.M. on the 13th. This thick fog was said by an observer to be precisely similar to that which accompanied the Lisbon earthquakes of 1807	D. Milne's Catalogue of British Earthquakes, loc. cit.

<p>Feb. 2. 3^h 2^m A.M.</p> <p>Liphook, Farnhurst, Petworth, Pulborough, Bognor, Portsmouth, and Gosport. The centre of intensity supposed to be a few miles N.W. of Chichester.</p>	<p>tory movements with two-thirds of a second intervening betwixt each. The undulation at Stanstead House was from W. to E., and appeared to be single. At Pulborough three distinct shocks were felt in quick succession.</p>	<p>At Stanstead Hall a bed was lifted up. The barometer stood at 30 in., and had previously risen and fallen very capriciously, without any corresponding change of weather. The morning of the previous day was rainy, foggy, and warm. At the time of the shock the air was calm, but instantly after, the wind rose and blew strongly from S.W., with rain and lightning. The same humid weather prevailed up to the close of January, and the season was nearly a fortnight in advance up to the end of March. For ten weeks before the occurrence of the shock, 23rd of January 1834, the wind had pertinaciously prevailed from the S.W., and it had rained almost daily to a depth of nearly 12 inches (!). Accompanied by a kind of subterranean bellowing noise.</p>	<p>Colla, Bibliot. Ital. t. 78.</p>
<p>8^h 45^m A.M.</p> <p>Ditto. Also felt at Trineste.</p>	<p>A severe shock. The motion was rather oscillatory than undulatory. Direction = N. to S. Lasted twenty or thirty seconds.</p>	<p>Compared by the inhabitants to the explosion of a powder mill.</p>	<p>Journ. des Débats, 9 Mars; Colla; Gargioli, Descrizione del terremoto di Pontremoli; Annali di Statistica di Milano, vol. xl.</p>
<p>12. Lancaster in Pennsylvania, United States.</p>	<p>A shock which shook all the houses and extinguished the lights.</p>	<p>Some damage done.</p>	<p>Ditto.</p>
<p>13. Pontremoli in Tuscany.</p>	<p>A severe shock, with undulations and "soubresauts."</p>	<p>At Pontremoli all the buildings were seriously injured, and in some villages five or six miles to the south, belfries, churches, and ill-built houses fell. Four persons perished beneath</p>	<p>Ditto.</p>
<p>14. Ditto. Especially at 2^h 30^m P.M.</p>	<p>The centre of Many more shocks, eleven or twelve of which occurred at the hour mentioned.</p>	<p></p>	<p></p>

1.	2	3.	4.	5.	6.
1834. Feb. 15. About 8 (A.M.).	Pontremoli in Tuscany.	At Parma the direction was S.W. to N.E. The most severe of the shocks was first vertical, then horizontal from N.W. to S.E., and lasted twelve seconds. About 3 ^h two other violent shocks.		The shocks at 2 ^h 30 ^m were preceded at Pontremoli by a very loud noise.	
— 16. Ditto	—	A rather severe shock at Pontremoli. About 1 ^h 30 ^m and 9 ^h 30 ^m (P.M.), at Parma, several others.			Journ. des Débats, 9 Mars; Colla; Gargioli, Descrizione del terremoto di Pontremoli; Annali di Statistica di Milano, vol. xl.
— 17. Ditto A little after 5 P.M.	—	Other slighter shocks at Pontremoli at intervals of three hours.			Ditto.
— 20. Chichester in Dorsetshire.	Chichester in Dorsetshire.	A very severe shock. At Brompton at least forty (forty-four?) shocks were counted altogether. The first (at 2 ^h 30 ^m P.M.) was felt more or less throughout Upper Italy. Slight but frequent shocks occurred up to the end of the month in the territories of Pontremoli and Volterra.		The inhabitants fled from their houses. These shocks were always preceded or accompanied by dull explosions.	Ditto.
2 A.M.	—	A slight shock			The report on these earthquakes at Chichester from which Mr. Milne has copied appears that

1834. Mar. 9.	At the mouth of the Kouban, at Anapa, and on the neighbouring part of the coast of the Black Sea.	An earthquake .....	.....	temper there was rain, during which the barometer fell nearly to 28 inches. The temperature of the ground had been unprecedentedly high for mid-winter, and the water in the wells 2° above the average.	Plieninger, Jahrsbericht über die Witterungs-Verhältnisse in Würtemberg.
— About 10 ^h 30 ^m P.M.	11. Acapulco. Felt also at the same hour at Mexico.	At Acapulco a severe vertical shock, known in the country as "secousse de trepidation"; said to be of the usual kind. Followed by other shocks for several days in succession. At Mexico, an undulatory movement which lasted more than two minutes.	On the third day after this, the sea retired about thirty-three metres from the shore, and then returned <i>gradually</i> to its ordinary level.	.	Dupetit-Thouars, Voy. de la Vénus, t. ii. p. 213.
— 0 ^h 30 ^m A.M.	21. Ranen in Helgeland ...	A severe shock, followed by a second at 3 ^h 30 ^m P.M.	.....	Walls were shaken, and doors slammed to. M. Keilhan supposes the day of the month to be wrongly reported.	Morgenblad, 1835, Nr. 661; Keilhan.
— ...	In the neighbourhood of Pontremoli and Volterra, in Tuscany.	More shocks .....	.....	.....	Colla.
— April 13.	Gibraltar, Cadiz, and Algairaz.	A slight shock.....	.....	.....	Ditto, Bibl. Ital. t. lxxviii.
— to 17.	15 In the district of Volterra, Tuscany, especially at Borgotaro.	Violent shocks.....	.....	Accompanied by loud explosive noises	Colla.
— May 2. Noon.	Pontremoli in same district.	A violent shock .....	.....	.....	Ditto.

1.	2.	3.	4.	5.	6.
1834. May 6. 11 P.M.	Kreni and Kischenew in Bessarabia.	A shock .....	.....	.....	Colla, Bibl. Ital. t. lxxviii.
8 A.M.	Pontremoli in Tuscany.	Very perceptible shocks, followed by slighter ones. Another shock .....	.....	.....	Colla.
.....	Kischenew in Bessarabia.	.....	.....	.....	Pfenniger, Jahrbuch über die Witterungs-Verhältnisse in Würtemberg.
5 ^h 25 ^m P.M.	Borgotaro in Tuscany.	A violent shock, with "soubresauts," lasting four or five seconds. At the same physical instant, a very slight shock at Parma.	.....	.....	Colla.
.....	Santa Martha in Sicily.	The first and most severe shock lasted three-quarters of a minute. Altogether sixty shocks during the four days.	.....	.....	The earth cracked in fissures which in many places were 6 inches wide, and from which hot and sulphurous vapour was ejected.
.....	Jerusalem	A very severe shock .....	.....	.....	Colla.
.....	Borgotaro in Tuscany.	A slight shock .....	.....	.....	Ditto.
June 6.	Ditto	A very perceptible shock.	.....	.....	Ditto.
.....	In the island of Cephalonia.	Severe shocks .....	.....	.....	Ditto.
.....	Pontremoli in Tuscany.	A severe shock .....	.....	.....	Ditto.
0 ^h 30 ^m P.M. July 4. 1 ^h 45 ^m A.M.	Parma, Milan, Genoa, and throughout Upper Italy.	At Parma a very perceptible undulatory shock, from S.W. to N.E., lasting more than ten seconds. At S. Vitale-de-Baganza (twelve miles S.W. of Parma) it was very violent.	.....	.....	Ditto: Journ. des Débats, 13 July.

1834. July 4. Brest in France (At same hour?)	tion was slight, undulatory, and from N.W. to S.E. Several more shocks were felt the next day.	.....	.....	Colla, Bibl. Ital.
8. Rungpoor in Bengal	A very distinct shock.	.....	.....	Asiatic Journal, N. S. vol. xiii. pt. 2. p. 91.
21. Ditto	Two shocks .....	.....	Fissures opened in the ground, from which smoke and flames were thrown out, and then the fissures closed.	Ditto.
Aug. 2. Borgotaro in Tuscany..... 8 ^h 40 ^m A.M.	A slight shock .....	.....	.....	Colla.
Night between 16 and 17. Midnight.	In Norway. Felt at Christiania, Ilvidesøe, in Tellemarken, at Drammen, Söndmör; Drontheim, Loessøe, in the Gullbrandsdal and Oesterdal, and at Bergen.	A ship off Cape Stat felt a shock as if they had touched upon a shoal.	Beds, doors, and windows were set in motion by vibrations and sudden shocks. At Elverum in the Oesterdal the peasants saw a meteor of extreme brilliancy, which deprived them of sight for some moments. At Bergen also a fire-ball was observed, passing from E. to W., and a boatman of the Sambford saw another, from which sparks seemed to be thrown off. Furniture and even houses were violently shaken.	Morgenblad. 1834, Nrs. 250. 253. 256; Keilhau.
23. Ilvidesøe in Norway ... 7 and 9 A.M.	Two shocks, one at each of the hours mentioned.	.....	.....	Ditto, Nr. 250; Keilhau.
Vesuvius	Three severe shocks .....	.....	Caused fissures to open on one of the flanks of the volcano.	.....
24. Ditto	Another shock .....	.....	Produced great fissures, from which lava and immense quantities of smoke came forth. The volcano was in a state of active eruption during the following days.	Ditto.
25. In Perthshire, Scotland	A shock .....	.....	.....	Communication of M. Plieninger of Stuttgart to M. Perrey.
27. Along the coast of Hampshire, at Portsmouth, Gosport, Southampton, Chichester, &c.	At Portsmouth and Gosport, violent shocks, lasting 3 or 4 seconds.	The 'Griper' sloop of war, lying in Chichester harbour, was thrown con-	At Portsmouth and Gosport, the clouds had been dense in the afternoon, and the atmosphere suffocating, and about 7 to 8 P.M. some peals of thunder were heard. The tempera-	Moniteur, 4 Sept.; D. Milne's Catalogue, <i>loc. cit.</i>

1834. Sept. Night be- tween 4 and 5.	At Hardanger in Nor- way.	According to some from N.W. to S.E., according to others, from S.E. to N.W.	.....	.....	Keilhau.
— 7.	Jamaica	A very violent earth- quake.	.....	.....	Trans. Geol. Soc. (London) 2nd se- ries, vol. v. p. 610.
— 13.	Niort in the departm. Deux-Sèvres, and the neighbourhood.	A slight vibration .....	.....	.....	Comptes Rendus de l'Acad. t. i. p. 129.
— 17.	In the islands to the south of Drontheim, Norway.	An earthquake shock .....	.....	.....	Laing's Travels and Residence in Norway (Lond. Longman, 1851), pt. 1. p. 80.
— 21. 11 ^h 20 ^m A.M.	Chichester	Another earthquake.....	.....	The day was cold and cloudy, after several days and nights of extraordinary and unseasonably hot weather.	D. Milne's Catalogue of British Earthquakes, <i>loc. cit.</i>
— 25.	Constantinople	Two shocks.....	.....	.....	Moniteur, 15 Oct.; Journ. des Dé- bats, 24 Oct.
— Oct. 4. 8 P.M.	Bologna. And at the same instant at Par- ma, Padua, and Ve- nice.	A violent shock, suc- ceeded by "sou- bresauts," and then by an undulatory movement which seemed to pass from E.N.E. to W.S.W., lasting about eight seconds. At Parma, Padua, and Venice a slight shock, last- ing two seconds.	.....	.....	Garnier, <i>Météorologie</i> , p. 174; L'In- stitut, 5 Nov.; Colla.
— 5. In the morn- ing.	Chichester	A severe shock. The earth quivered for at least 2 minutes.	.....	.....	Annual Register, 1834, p. 152; Journ. des Débats, 30 Oct.
— 6. 3 and 7 A.M.	Cartagena in Spain ...	Three shocks, two of which occurred at 3, and one at 7 A.M. Followed by others the next day.	.....	Followed the same day by a tremendous storm of thunder, lightning, and rain.	Communication of M. Colla to M. Perrey.

1835. Jan. 6. Acapulco in Mexico. A violent vibratory ("de trepidation") shock. At Mexico the motion was undulatory, as on the 11th March 1834.	The sea exhibited no disturbance.	The whole town was destroyed.	Dupetit-Thouars, Voyage de la Vé-nus, t. ii. p. 214.
12. Borgotaro in Tuscany...	A very perceptible undulatory shock.		Colla.
7 A.M.	A slight shock.		D. Milne's Catalogue, loc. cit.
8 A.M.			
20. Volcano of Cosiquina in Mexico, and the surrounding district within a radius of more than twenty leagues.	The first shock, followed by others on the 21st and following days.	Accompanying a violent eruption of the volcano. The attendant subterranean noise was heard at places far removed from the scene of the eruption, and the shower of ashes also extended to enormous distances. The eruption began on the 19th, and was most violent on the 23rd.	Comptes Rendus de l'Acad. t. iv. p. 801, t. v. p. 75.
21. Collecchio and Sala, in the Parmesan territory.	A slight shock.		Colla.
2 ^h 5 ^m A.M.			
26. Borgo-San-Domino in the Duchy of Parma.	A very slight shock.		Ditto.
10 ^h 54 ^m A.M.			
Feb. 5. Borgo-S.-Lorenzo in the Mugello, Italy. Also felt at Vicchio.	A rather severe shock, at first vertical, then undulatory, lasting but a few seconds. At 9 ^h , another rather severe shock occurred, and on the following days, slight tremblings.	Preceded by a noise which came from the east. At Borgo-S.-Lorenzo some walls were cracked, but at Vicchio the damage done was more considerable. Perhaps only the same event with that next recorded.	Notizia Manoscritta del Sig. Andreucci di Borgo-S.-Lorenzo, communicated by Sig. Pilla to M. Perrey.
8 P.M.			
6. Florence. The centre of disturbance appears to have been situated in the northern part of the Mugello, where, however, there was not much damage done.	A severe shock. Several other slighter ones during the evening.		Journ. des Débats, 20 Fév.; Colla.
7 ^h 50 ^m P.M.			
7. Rome and the environs.	A slight shock.		Colla.
9. At sea, in 0° 57' S. lat., and 25° 39' W. long. (from Paris).		On board the barque 'La Couronne' of Liverpool a shock	Daussy in the Comptes Rendus de l'Acad. t. vi. p. 514.
10 ^h 45 ^m (A.M. or P.M.?).			

1.	2.	3.	4.	5.	6.
1835, Feb. 12. At sea, felt very strongly, off the coast of Guano.	14. Santiago, Concepcion, and the rest of Chili. Also felt on Juan Fernandez. Extended N. to S., from Copiapo to Chiloe, and from E. to W., from Mendoza to Juan Fernandez.	A slight oscillation, lasting about 20 seconds. Three oscillations, of which the first was very gentle, and the second and third very violent. Direction, apparently, S.W. to N.E. The earth was not quiet for three days after, and more than 300 shocks were counted between the 20th February and 4th March.	was felt as if the vessel had struck on and grated along a coral reef. On sounding, no bottom was found within 135 fathoms. The ship was going at the rate of six knots with a fine breeze from the E.S.E.		Trans. Geol. Soc. (London), 2nd series, vol. v. p. 610. Ditto; Phil. Trans. 1836, p. 21.
11 ^h 30 ^m A.M.			The sea retired from the coast, flowed in again, and again retired, when an enormous wave rolled in to the height of 28 feet above high-water mark, this being followed by another and still larger wave, and that by two smaller ones. Two eruptions of dense smoke were seen to issue from the sea; and in the place where the second of these occurred a whirlpool was formed in the shape of an inverted cone, as if	In some places preceded by a rumbling noise; in others none such was heard. Great fissures opened in the earth, from which gases and muddy and salt water were in many places thrown out. The earth is said to have opened and closed rapidly in many places. The direction of the cracks was not uniform, but generally from S.E. to N.W. The loose earth of the valley of the Biobio was everywhere parted from the solid rocks, the opening between them varying from an inch to a foot in width. The coast was permanently elevated to a considerable extent, varying from one to ten feet at different places; on the whole Captain Fitzroy concludes that the land was raised four or five feet in February, and that it returned in April to within two or three feet of its former level. Concepcion, Talcahuano, Chillan, and other towns were thrown down. The earthquake was preceded by fine weather, and followed by storms of wind and rain.	Ditto: Darwin's Journal of Travels in South America, in Voyage of H.M.S. Beagle, p. 372.

1835. Feb. 27. 10 A.M.	Delle, Dannemarie, Mul- house, and other places in the Sundgau, de- partment Haut-Rhin. Not felt at Bâle.	A tremor .....	.....	.....	Mérian.
— Mar. 6. At night.	Cagliari in Sardinia.....	Some slight undula- tory shocks from W. to E.	.....	Accompanied by a violent N.W. wind	Colla.
— — — 6 A.M.	Beaumont in the de- partment Vaucluse, and Manosque in the Basses-Alpes.	Two shocks, with an interval of six mi- nutes.	.....	.....	Journ. des Débats, 24 Mars.
— — — About 9 ^h 15 ^m A.M.	Borgotaro in Tuscany...	A strong undulatory shock, lasting 8 secs. Half an hour after, two other shocks, one of which was very slight.	.....	Preceded by a sudden loud noise	Colla.
— — — 12.	Different places in Hun- gary.	Violent shocks .....	.....	.....	Ditto.
— — — 2 ^h 40 ^m A.M.	Borgotaro in Tuscany...	Another slight shock.	.....	.....	Ditto.
— — — 2 ^h 7 ^m A.M.	Palermo	Severe shocks, with "soubresauts."	.....	.....	Ditto.
— — — 4 ^h 23 ^m A.M.	Ditto	Three other shocks, lasting 5 or 6 secs. The motion was un- dulatory, from N.E. to S.W.	.....	Flashes of lightning darted from a particular group of clouds.	Ditto.
— April 1. 7 P.M.	Vesuvius, and as far as Naples.	Four shocks.....	.....	Accompanied by explosions, and a violent erup- tion of Vesuvius after a long period of repose.	Journ. des Débats, 21 Avril; Ar- chives des Découv. 1835, p. 29 et suiv.; L'Institut, Nrs. 102, 113 et 116.
— — — 3.	In the county of Szath- mar in Upper Hungary.	Violent shocks.....	.....	.....	Colla, Bibl Ital. t. lxxviii.

1.	2.	3.	4.	5.	6.
1635. Apr. 15. Borgotaro in Tuscany 11 ^h 45 ^m A.M.		Two slight shocks ...			Colla.
18 ^h 25 ^m P.M.	In the valley of Inter-lacken, Switzerland.	A very severe shock, lasting nearly a min. Followed, 5 minutes after, by a second, and at 9 ^h 45 ^m by a third and lighter one.		The new building of the château was shaken by three successive shocks, besides formidable vibratory motion. The earth was distinctly shaken as by a blow, and the bell sounded.	Ditto; Méria.
4 A.M.	20. Borgotaro in Tuscany...	Another very severe shock, undulatory, lasting 5 secs. At 6 ^h , two other violent shocks, and at 2 P.M. two others, prolonged, and very severe.		The shocks at 2 P.M. were accompanied by detonations.	Colla.
8 ^h 30 ^m P.M.	21. Kischnew in Bosnia, and at the same instant at Ismael.	At Kischnew a severe shock from N. to S., lasting 3 or 4 secs.		Followed by lightning and a very impetuous wind.	Ditto, Bibl. Ital. t. lxviii.
3 ^h 45 ^m A.M.	25. Borgotaro in Tuscany. Felt with the same violence at Pontremoli, Compiano, and Bedonia, and slightly at Bardi.	Another very severe undulatory shock.		Accompanied by very intense noise. The inhabitants fled from their houses.	Colla.
May 10. About 10 ^h 30 ^m P.M.	Again at Borgotaro.....	Another slight shock.			Ditto.
1 ^h 10 ^m A.M. at Trieste.	Trieste, and at Laybach in Carnathia.	At Trieste an undulatory shock from S. to N., lasting 4 secs. At Laybach a severe shock.			Ditto, Bibl. Ital. t. lxviii; Garnier, <i>Météorologie</i> , p. 175.
Between 1 and 2 at Laybach.					
23	Hoves near Cunco or Con, in Piedmont.	Two shocks.....			
June 12	Rougemont, Chateau d'Oax, in the eastern	An earthquake		The first shock was of sufficient strength to throw down a great number of chimnies.	Méria.

part of the Canton du Vaud. Less severely felt at Villeneuve and Montreux.	A very perceptible movement of the ground, in the direction S.W.to N.E.		Preceded by a loud explosion, which lasted two seconds.	Annual Register, 1835, p. 94; Journ. des Débats, 9 Juillet; Moniteur, 10 Juillet.
1835. June 16. 0 ^h 29 ^m A.M.	Another shock, not quite so strongly felt as the last.		Ditto, not quite so loud as the last	Ditto.
— — — 17. Ditto 0 ^h 29 ^m A.M. (Same hour as on the 16th.)	Ditto, intermediate in intensity between the first and second.		Ditto, intermediate between first and second. The atmosphere was very clear and serene.	Ditto.
— — — 20. 8 ^h 16 ^m P.M.	Some shocks	An hour before, the sea to the south of Cape Vasilico appeared tinged of a reddish colour, like that of safflower, and diffused a strong acid odour (!).	During the eruption of the volcano	Journ. des Débats, 22 Juin. Colla.
— — — July 12. 10 A.M.	Vesuvius			
— — — In the neighbourhood of Zante, in the island of same name.	A severe shock			
— — — 31. A little before 10 P.M.	Eglisau in the canton of Zurich.			Mérian.
— — — Aug. 1. 8 ^h 45 ^m P.M.	Borgotaro in Tuscany.		Subterranean noise, lasting several seconds. No shock is mentioned.	No Colla.
— — — 20. Midnight (of the 19th) and 3 ^h 30 ^m A.M.	Liverpool, Lancaster, Chitheroe, Blackpool, and other parts of Lancashire.	The second and more violent shock was vibratory, and lasted about 30 secs.	Accompanied by a noise like that produced by the dragging of heavy artillery over pavement. The motion felt as if the ground were rising and falling.	Annual Register, 1835, p. 128; D. Milne's Catalogue, loc. cit.
— — — 23. 5 P.M.	Kaisarich in Cappadocia, and the surrounding country. (The Mentioner of Sept. 21 mentions an earthquake at Trebizond in the beginning of August, and says that 300	A terrible earthquake. The shocks continued six hours, during which time it seemed to an observer as if he were tossed upon the surface of a tem-	Preceded at Kaisarich by the appearance of a thick smoke on Mount Ardscheh, whence there issued flames, accompanied by dreadful noise, like the eruption of a volcano. During the whole period of the earthquake the shocks were accompanied by noise like thunder. More than 200 houses fell at Kaisarich, and 150 persons perished. All the villages to the	Journ. des Débats, 7 Nov.; Comptes Rendus de l'Acad. t. i. p. 252; Garnier, p. 175; Huot, Cours de Géol.; Gentleman's Magazine, N. S. vol. v. pt. i. p. 195.

1.	2.	3.	4.	5.	6.
	Houses were destroyed by it at Kasur. This no doubt refers to the event here recorded.)	pestuous sea. The shocks recurred, though with much less violence, up to the 1st Sept.		south of this place, for a circuit of more than 30 miles, suffered dreadfully, almost all the habitations being utterly destroyed, and many of the people losing their lives. Kumetri is said to have been swallowed up, and a lake formed in its place. The Gentleman's Magazine gives the date August 25.	Asiatic Journal, N. S. vol. xix. pt. 2. p. 128. Colla.
1835, Aug 26 Singapore		Lasted a few seconds.			Moniteur, 7 Oct.
— 30. Constantanople		A slight shock.			
— 7 th 8 th A.M.					
Sept. 14. Niot in the departm	Deux-Sèvres, and St. Jean-d'Angely in the departm. Charente-Inférieure	A shock			
— — — — —	Dre, Sailans, and Val-de-Grâce, in the departm. Drôme, and west of La Lauce.	A subterranean commotion.		Accompanied by noise. It is observed that the lines joining these places and those last mentioned (Niot and St. Jean-d'Angely), are very nearly parallel, but it seems improbable that the shock felt in both districts was the same, particularly as in each case it was only felt over a space of some myriamètres.	Ditto.
Day not given. Between 6 and 7 A.M.	In the arrondissement of Yvetot, and at Bourg-Dan in the arrondissement of Dieppe, département Seine Inférieure. Felt over a space of but two myriamètres.	A slight shock, lasting not more than 3 or 6 secs.	Also felt by some sailors who were out fishing.	A dull noise was heard, and some articles of furniture were shaken about.	Garnier, Météorologie, p. 175.
Oct. 12. In the middle of the night.	In Calabria Citra, and on the confines of the adjoining provinces. The centre of disturbance seems to have been at Castiglione in the commune of Cosenza.	Violent shocks. The first lasted 4 secs., and was followed by ten others the same night, and several more during the following days.		Castiglione was utterly destroyed and razed to the ground. Out of its 1000 inhabitants, 100 perished beneath the ruins, and many others were grievously injured. At Cosenza the buildings were seriously damaged, but no lives were lost. In other neighbouring districts there were 30 persons killed and as many	Journ. des Débats, 9 Déc.; Moniteur, 10 Déc.; Colla.

PARMOUTH, HAUTE-LOUZE. Also felt at Louzer, Valcabrière, Izaout, Anla, and the whole neighbourhood.	HAUTE-LOUZE. The movement was E.S.E. to W.N.W., which is said to be precisely the direction of the beds of compact limestone of the lower chalk on which St. Bertrand is built, and also the direction of the whole chain of the Pyrenees. An hour after the first shock a second was felt at St. Bertrand.	HAUTE-LOUZE. The movement was E.S.E. to W.N.W., which is said to be precisely the direction of the beds of compact limestone of the lower chalk on which St. Bertrand is built, and also the direction of the whole chain of the Pyrenees. An hour after the first shock a second was felt at St. Bertrand.	HAUTE-LOUZE. The movement was E.S.E. to W.N.W., which is said to be precisely the direction of the beds of compact limestone of the lower chalk on which St. Bertrand is built, and also the direction of the whole chain of the Pyrenees. An hour after the first shock a second was felt at St. Bertrand.
28. Lux, near Baréges in the same district. About 3 ^h 45 ^m A.M.	A severe shock, the most violent remembered at this place. Direction = W. to E. Lasted 4 or 5 seconds. Two other shocks, but of much less severity, were felt, with an interval of a quarter of an hour.	.....	..... All the furniture in the houses was displaced ... Ditto.
About 4 ^h 30 ^m A.M.	Tarbes in the departm. Hautes-Pyrénées, and for several leagues round.	.....	At Bagnères the inhabitants fled in alarm from their houses. Some walls and ceilings were cracked. The shocks were followed by a loud noise like the rolling of thunder amongst the gorges of the Pyrenees. Direction = W. to E.

was accompanied by a subterranean noise like the rolling of a heavy cart.

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1.	2.	3.	4.	5.	6.
1835, Oct. 29. St. Gall, Appenzell, and about 4 a.m., the neighbouring district (At Bale, at strict, Switzerland. 3h 47 ^m .) Also felt at Bale.		A violent shock		Several bells were made to sound. A dull sound like the report of a cannon in the distance was heard. Luminous meteors were observed.	Colla; Mérian.
Nov. 1. In the Moluccas islands. 3 a.m.		A violent and destructive earthquake. In Amboyna the single shock on this day lasted 35 secs. It was the most violent, but other shocks were felt on the 4th.		Preceded for three weeks by a heavy sulphurous fog. A volcanic eruption at the same time at Gumong Api in the island of Banda. Buildings were ruined and many persons lost their lives.	Asiatic Journal, N. S. vol. xi. pt. 2, p. 173.
Nov. 11. Concepcion in Chili		A severe earthquake. Followed at intervals by ten other shocks.		The volcanoes of Osorno and Corcovado, at the distance of 400 miles, were in violent action. (Thus doubtless refers to the event recorded under Oct. 12; but which is the correct date?)	Trans. Geol. Soc. (London), 2nd series, vol. v. p. 610. Annual Register, 1835, p. 154.
Middle of the night. 4 p.m.		Severe shocks			Colla.
End of the month. During the night.		Some persons supposed they had remarked earthquake shocks.		Others said they had heard subterranean noises like loud explosions. After rather severe cold the weather suddenly changed, and a hot suffocating south wind arose.	Moniteur, 3 Déc.
Dec. 17. Athens. Felt also simultaneously at Thebes.		At Athens two shocks, one of which was very violent.			Colla.
In the morning. 1836, Jan. 3. Mindanao, one of the Philippine isles.		Very violent.		Several volcanoes in Mindanao active at the time.	Asiatic Journal, N. S. vol. xx. pt. 2, p. 236.
4 ^h 3 ^m a.m.		Two undulatory shocks.		An account written some time after says that since this earthquake the atmosphere had been extremely warm, the evenings resembling those of spring. A more violent shock was expected.	Garnier, p. 178; Colla.
24. Chandernagore and Saugor, Hindostan.					Asiatic Journal, N. S. vol. xi. pt. 2, p. 187.
28. At sea, in 0° 40' S. lat. and 22° 30' W. long. (from Paris).		On board the ship 'Le Philanthrope' of Bordeaux, a sharp			Dansey in the Comptes Rendus de l'Acad. t. vi. p. 514.

1836. Feb. 9. 5 P.M.	Different places in the county of Simegh in Hungary.	A very severe shock.	The next day the waters of a lake were still very much agitated, and rose to an extraordinary height.	the vessel tremble, for three minutes, as if she had struck upon a bank. Also felt on board an American ship, ten miles to the west of the 'Philanthrope,' at the same time.	Preceded by terrible noise, and extraordinary disturbances in the atmosphere. At Zallès-Gyorok the ruins were numerous. In some places flames issued from the ground.	Colla, Bibl. Ital. t. lxxviii.
— 23. 0 ^h 33 ^m P.M.	Parma and the neighbourhood.	A very slight shock from E. to W., lasting 2 secs.				Colla.
— 24.	In the neighbourhood of Sala in the duchy of Parma.	Another very slight shock.				Ditto.
— 26. — March. Beginning of the month.	Ditto Kaisarich in Asia Minor (Cappadocia).	Ditto Severe undulatory shocks.				Ditto. Ditto.
— 26. 3 ^h 50 ^m A.M.	Fribourg in Switzerland.	Three very severe shocks.				Ditto; Mérian.
— April 4. In the morning.	In Shropshire	A shock				Communication of M. Plieninger of Stuttgart to M. Perrey.
— 24. At night.	District of Rossano in Calabria Citra, especially the communes of Rossano and Croscia. Also felt at Cinnosa in the province of Otranto, Craco in the Basilicata, and at Naples.	A terribly destructive earthquake. At Naples two shocks were felt during the night.	The sea retired forty paces at one part of the shore, and advanced to an equal extent at another. Volcanic substances and fish of species unknown to the fishermen were thrown upon the beach.	In Rossano, an instant after the shock, all the houses were seen either thrown down or crumbling into ruins; and in Croscia not a single house was left standing. Long and deep fissures opened in the earth. An igneous meteor was seen, having the appearance of great beams on fire. At Cinnosa and Craco some buildings were thrown down. The next day Vesuvius sent forth thick smoke.		Colla, Méteorologie, p. 178; Colla.

1.	2.	3.	4.	5.	6.
1830 May 19 Spallaro in Dalmatia, 2 ^h 44 ^m P.M. and the neighbour- hood.		A severe shock. The motion was at first undulatory, from S.E. to N.W., but then became vertical.		Preceded by subterranean bellowing noise. At the time of the most severe shock a violent S.E. wind blew.	At Colla.
13. About 5 A.M. At Parthenay, 5 ^h 3 ^m A.M.	Angers, Nantes, and Parthenay, in the west of France.	At Angers several shocks. At Nantes a slight vibration. At Parthenay two shocks, more violent than at the other places, from N.W. to S.E., succeeding each other with but little interval. Followed at 10 ^h 30 ^m P.M. by another shock in the same direction, but slighter.		Preceded at Angers by a dull sound. In many houses the windows and articles of furniture were violently agitated. At Parthenay the shocks were accompanied by subterranean noise like distant thunder. The second caused a general and violent tremor. Persons who were up felt themselves raised from the ground; others who were in bed and asleep were awakened by a commotion like that produced by an electrical machine (an electric shock?), and felt themselves ill for a considerable time.	Journ. des D�bats, 17 et 19 Mai; Bull. de la Soc. G�ol. t. vii. p. 260; Bibl. Ital.
14. June 11 to 18.	La Rochelle... In the province of Trevisa. The shock of the morning of the 12th was felt at many places in Upper Italy.	A slight oscillatory motion. Very severe shocks. The first, on the 11th at 11 P.M., was followed by a more violent one at 3 ^h 35 ^m A.M. the next morning, and by sixteen others of less severity in the course of the week. The shock of the morning of the 12th was particularly distinct at Venice, where it seemed to pass from E. to W.		In the district of Ascoli houses were thrown down and others much injured. There had been a shock at Venice about the beginning of the month.	Ditto. Moniteur, 24 Juin et 26 Sept.; Gar- nier, p. 180; Colla.

1836. June 12	Parma	Slight shocks .....	.....	.....	Ditto.
and 13.					
— 15.	Frascati in the Romagna.	Two slight shocks .....	.....	.....	Ditto.
1 P.M.					
— 21.	Venice	An undulatory shock .....	.....	Accompanied by subterranean noise.....	Ditto.
4 A.M.		from N.E. to S.W., lasting 4 or 5 secs.			
— 22.	Different places in Cen-			Accompanying the eruption of a volcano to the	Journ. des Débats, 23 Juillet; Com-
and 23.	tral America.			east of Omoa. Perhaps this event occurred,	munication of M.Colla to M. Perrey.
— 29.	Laybach in Carinthia	An undulatory shock .....	.....	.....	Colla, Bibl. Ital. t. lxxviii.
2 ^h 28 ^m A.M.		from E. to W.			
— July 7.	Soleure and the neigh-	A severe shock from .....	.....	.....	Ditto; Mérian; Studer.
6 ^h 15 ^m P.M.	bourhood.	S. to N.			
— 15.	Parma	A very slight shock .....	.....	.....	Journ. des Débats, 4 et 6 Août; Mo-
0 ^h 35 ^m P.M.		from E. to W.			niteur, 6 Août; Garnier, p. 180;
—					Colla.
—	Venice	Two undulatory .....	.....	.....	Ditto.
1 P.M.		shocks from N. to			
—		S., the first lasting			
—		3 seconds and the			
—		second 4.			
— 20.	Bassano and the neigh-	At Bassano and the .....	.....	Along the mountain from Borso to Passagno	Ditto.
About noon.	bouring places, govern-	neighbouring places		some houses were thrown down, and some	
	ment of Venice, in Up-	there were three		persons lost their lives, and at Passagno many	
	per Italy, the Tyrol, as	shocks, of which the		houses were injured. At Brixen it seemed as	
	at Innsbruck, and at	most severe oc-		if some one were marching with heavy tread	
	Munich.	curred at noon.		up and down in the room overhead, and a	
				noise was heard like distant thunder. The	
				next day an icy storm, following upon suffo-	
				cating heat.	
— Aug. 8.	Smyrna	Five shocks, the first .....	.....	At 10 P.M. a luminous meteor had been seen,	Colla.
Midnight (of		of which was from		which sent forth numerous sparks.	
the 7 th ?),		N. to S., and very			
and 3 A.M.		severe.			
— 11.	Messina	A very slight shock .....	.....	.....	Ditto.
5 ^h 45 ^m A.M.					
— Sept. 16.	Nismes in the departm.	A general tremulous .....	.....	Accompanied by a loud explosion. Walls and	Bibl. Ital.
1 P.M.	du Gard, and more	motion, lasting 2 or		moveable objects distinctly oscillated.	
	distinctly at Vauvert	3 secs.			
	and some neighbour-				

1.	2.	3.	4.	5.	6.
1836, Sept. 26. About 7 ^h 45 ^m p.m. at Modena. About 8 p.m. at Venice.	ing villages. Also felt at Besençon, but not at all at Montpellier. Modena, and Venice and the environs.	At Modena a slight undulatory shock, as also at Venice, where the motion was from E. to W., and lasted some seconds. Two shocks			Colla.
— 27. — Towards evening Oct. 5 A little before 5 p.m.	Oran on the north coast of Africa. Zara in Dalmatia.	A slight undulatory shock. Severe shocks		Objects placed upon articles of furniture were thrown down.	Moniteur, 18 Oct.
Night between 18 and 19. 10 a.m. — Nov. 7 a.m.	Sarnen in the canton of Unterwalden, Swit- zerland. Blythwood (in Ren- frewshire). 5. Balle and in the north- west part of Switzer- land, on the one side at Lorrach, and on the other in the Ler- menthal, at Aries- heim, Schauenbourg, and very slightly at Bissham, Soleure, Soudan, and Liestal.	Violent shocks from S. to N.		The magnetic needle at Milan was much affected on the 18th. D. Milne's Catalogue, loc. cit. D. Milne's Catalogue, loc. cit. The earthquake at Altkirk about the end of the year mentioned in the Journal des Débats, 30 Janv. 1837, probably refers to the event of this day.	Colla, Bibl. Ital. t. lxxviii; Mérian; D. Milne's Catalogue, loc. cit. D. Milne's Catalogue, loc. cit. Colla, Bibl. Ital. t. lxxviii; Mérian, pp. 67 et 84.
— 13. — At night,	Various places in Croa- tia.	Numerous and vio- lent shocks, which continued, though with less intensity, up to the 16th. More shocks			Colla, Bibl. Ital. t. lxxviii
— 18. — 6 ^h 30 ^m to 10 a.m.	Ditto				Ditto.

1836. Nov. 20. 8 A.M.	Naples	A violent shock	The following night a loud noise heard from the interior of Vesuvius. Some peals of thunder also heard.	Journ. des Débats, 8 Déc.; Moniteur, 9 Déc.
— 21. —	Grenada in Spain and the surrounding localities.	Severe shocks		Colla, Bibl. Ital. t. lxxvi.
— 22. —	Various places in Croatia.	More shocks		Ditto, t. lxxviii.
— Night between 28 and 29 (O.S. or N.S.?). About midnight.	Slato or Slaskow in the Oural. Also at the village of Turgojack, and in the neighbourhood of the mines of Kischtimski.	A severe shock from N.E. to S.W., lasting 3 secs.	Preceded by a subterranean noise like that of several carriages passing over pavement. This event is probably dated according to old style, and, if so, is doubtless the same with the next recorded.	Communication of M. Colla to M. Perrey.
— Dec. 11. —	Slatoust, Kychtinsk, and Turdojask, in the southern part of the Oural.			v. Humboldt, Asie Centrale, t. ii. p. 119.
— 23. — 9 ^h 30 ^m A.M.	Eglisau in the canton of Zurich, Switzerland.	A vibration		Mérian.
1837. Jan. 1. 9 ^h 40 ^m A.M.	Ancona	A severe undulatory shock from E. to W.		Colla.
— A little after sunset.	In Syria, extending over a district of 500 miles in length by ninety in breadth. Less severely felt in the north. The centre of disturbance was supposed to be the subterranean volcano which throws forth the bitumen into the Dead Sea (!).	During the earthquake the waters of Lake Tiberias were in a state of violent disturbance.	From Beyrout and Damascus to Saphit, the devastation of the country continually increased. In the latter place not one stone was left upon another, and out of the population of 4000, 3500 persons perished beneath the ruins. Tiberias, &c. suffered greatly. Whole villages are said to have been swallowed up. Those of Lubic and Rani were completely destroyed, whilst Keffar-Renna (the ancient Cana in Galilee), situated between the two and near Rani, had not a single house thrown down, and the shock was very little felt there. Deep fissures were formed in solid rocks, and at Tabarich new hot springs made their appearance. At Nazareth the earth opened for 112 feet in length by 1½ foot in breadth, and then closed within ½ths of this breadth again.	Journ. des Débats, 24 Fév., 17 Mai, et 1 Juin; Moniteur, 24 Fév. et 22 Mai; Garnier, Proceedings Geol. Soc. (Lond.) vol. ii. p. 658; Annual Register, 1837, p. 15; Asiatic Journal, N. S. vol. xxiv. pt. 2. p. 175.

1.	2.	3.	4.	5.	6.
1837. Jan. Night between 10 and 11. About mid- night.	Poitiers in France	Two shocks, one of which was very se- vere.			Colla, Ann. Astr. 1839, p. 109.
About 2, and 4 or 5 A.M.	Geneva.	Two severe shocks			Ditto; Journ. des Dénats, 30 Janv. et 1 Fév.; Moniteur, 2 Fév.; L'Institut, Nr. 218. 1837; Garnier, Ditto; Bull. de l'Acad. Roy. de Bruxelles, t. iv. p. 74.
About 2 A.M. At Altkirk, at 1 ^h 45 ^m and some mins. after 2 ^h . At Stuttgart & Oberndorf, at 1 ^h 54 ^m , & 2 ^h 11 ^m . At Sion & Brieg, at 1 ^h 59 ^m . At Constance, 2 A.M. At Berne, about 1 ^h 47 ^m , and 2 ^h 7 ^m . At Besançon, 2 ^h 32 ^m .	Altkirk, Besançon, Bâle, Berne, Soleure, Con- stance, Sion, Hurdorf, Stuttgart, Oberndorf, Zurich, Dorneckdorf, in the canton of So- leure, Geneva, Brieg, and other places in the duchy of Baden, in Wurtemberg, Al- sace, Switzerland, Lombardy, and Pied- mont.	Severe shocks. At Altkirk there were two, the first lasting eight seconds, the second a shorter time. At Stuttgart and Oberndorf there were also two shocks; direction—E. to W. At Sion and Brieg there were likewise two; at Burdorf three, in the direction S.S.W. to N.N.E. At Constance a violent shock, followed by another half an hour after. At Zurich the shocks were violent but of short duration. At Berne, three shocks, the two latter of which were less distinct than the first, and occurred at 2 ^h 7 ^m . At Bâle and in the neighbouring communes two or perhaps three more.		At Altkirk the first shock was preceded by a noise like the fall of a mass of stones. The air was calm and clear. At Sion and Brieg the attendant noise seemed to pass from S. to N. The hygrometer at Sion, which had been so steadily fixed between 90° and 100° for two months that the instrument was supposed to be out of order, suddenly rose 15°. At Bâle persons who were asleep were awakened, and at Soleure some cages of birds were thrown down. At Besançon the first shock threw loose objects from S. to N., and then back again from N. to S.	

1897. Jan. 25. Zurich..... 3 ^h 6 ^m A.M.	ments were felt. At Dorneckdorf there were two shocks, N. to S. At Brieg the shocks and attendant noise recurred for several days. At Besançon, two shocks with an interval of half a second. The first shock was from S. to N. and then N. to S., the second was from E. to W. In Lombardy and Piedmont the motion was from N. to S.	A slight shock.....	.....	Mérian.
— 28. — 11 ^h 58 ^m P.M.	In the canton of Soleure. Felt more strongly at Seeburg and Steinhof than at Soleure.	Very distinct shocks.....	.....	Ditto; Colla, <i>loc. cit.</i>
— 29. —	Vizille in the departm. Isère.	A strong subterranean movement. Several shocks .....	.....	Colla, <i>loc. cit.</i>
— Night between 30 and 31. —	Slightly felt at Brieg in the Valais, but more violently at some leagues distance, nearer to the sources of the Rhône.	.....	.....	Bull. de l'Acad. Roy. de Bruxelles, t. iv. p. 75.
— Feb. 14. —	Soleure.....	Slight shocks .....	.....	Mérian.
— 16. —	Ditto	Ditto .....	.....	Ditto.
— 18. —	Ditto	Ditto .....	.....	Ditto.
11 ^h 54 ^m P.M.	.....	.....	.....	.....
— 19. —	Bâle	A very slight shock.....	.....	During a storm. Considered very doubtful by Mérian.
7 ^h 30 ^m A.M.	.....	.....	.....	.....
— 20. —	Soleure	Slight shocks .....	.....	Mérian.
Midnight.	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
1837, Feb. 25. About 5 ^h 15 ^m A.M.	Ghent	A rather severe oscillatory shock, from S.E. to N.W., lasting two or three seconds. More severe than that which occurred here eight years before.		During stormy weather. Wind S.S.W. Thermometer $-4^{\circ} \frac{2}{3}$ R.	Ther. Garder, Météorologie, p. 183.
— 29.	In the southern part of the Ormal, at Slawost, Kychinsk, and Turdojask near Minsk.				v. Humboldt, Asie Centrale, t. ii. p. 119.
— March 3. Two hours and some minutes after midnight (of the 2nd).	Zara in Dalmatia	A severe shock, from S.W. to N.E., lasting two seconds.		Preceded by a dull noise	Colla.
8 ^h 45 ^m P.M.	Ponugia in Italy	A very distinct shock from N. to S.		The magnetic needle had been disturbed several days before.	Ditto.
— 8. Beginning of the night.	Messina	A severe shock, from E. to W.		Ditto.	Ditto.
— 15. 4 ^h 45 ^m P.M. (The Bull de l'Acad. Roy. de Bruxelles, loc. cit. gives the date March 14, 4 ^h 43 ^m P.M.)	Vienna. Also felt at Brunn, Gratz, Talbin, Linz, and other places in Austria.	Two shocks, the first at the hour mentioned, the second a few seconds afterwards. From N.W. to S.E. Each shock lasted about two or three seconds. There had been two others at 4 ^h 3 ^m (?).		Bella rang	Bull. de l'Acad. Roy. de Bruxelles, t. iv. p. 127; Moniteur, 27 Mars; Colla, Ann. Astr. 1839, p. 110.
— 18. to April 1, especially on the 20th.	In Hydra and other islands of the Grecian Archipelago; the centre of disturbance apparently at Methone. Also felt at the same time in the interior of Greece.	Disastrous shocks, which in Hydra occurred several times daily.		Some houses in Hydra were thrown down and others injured. In the islands of Spezia, Paros, and Santorin, damage was also done.	Journ. des Débats, 25 Avril; Colla; Garnier; Berghaus, Länder-und Völker-Kunde, B. ii. S. 709.

1837. Mar. 28. 8 ^h 30 ^m P.M.	In the islands of Lagosta and Curzola, Dalmatia.	A very distinct shock, from E. to W.		Preceded by a dull noise. In Curzola a luminous meteor had been seen at 6 ^h 15 ^m , which was like a train of fire, and vanished in the east.	Colla.
April 11. 5 ^h 30 ^m P.M.	Ugiano and other places in Upper Italy. Extended from Genoa to Florence. The centre of disturbance seems to have been the Pizzo-di-Uccello, one of the highest peaks of the Apuan Alps.	The first shock at the hour mentioned was followed by others until the next morning, in which time thirty-two were counted. According to some accounts the motion was undulatory, according to others vibratory and perceptibly vorticose.		Preceded by a terrible rumbling noise (rombo). Houses were thrown down, and some persons lost their lives. The Pizzo-di-Uccello was seen to shake, while avalanches of snow and huge masses of rock descended from its sides. The mineral waters of Equi were troubled. The earth opened in several places.	Ditto; Journ. des Débats, 27 Avril; Giornale Agrario Toscano, Nr. 43.
— — — — — 12.	Hartford in Connecticut	Very slight			Silliman's Journal, vol. xxii. p. 339.
May 27. About 6 P.M.	Coblentz	A slight shock			Garnier, Météorologie, p. 183.
— — — — — 28. 6 ^h 35 ^m A.M.	Island of Martinique	A very strong shock		The volcanic phenomena previously observed in Guadeloupe did not extend to Martinique.	Comptes Rendus de l'Acad. t. v. p. 194.
— — — — — In the evening.	In the environs of Rome, at Velletri, and principally in the district of the extinct volcano of Monte Lavinio.	Several very distinct shocks.			Journ. des Débats, 13 Juin; Garnier, p. 185; Colla.
— — — — — 29. Before sunrise.	Albano, Marino, Frascati, &c., in the neighbourhood of Rome.	Three severe shocks			Ditto.
— — — — — 31. 5 ^h 15 ^m A.M.	Innsbruck in the Tyrol.	Two severe shocks			Garnier, Météorologie, p. 186.
— — — — — June 1.	Some places in the department du Cher.	Severe shocks			Colla, loc. cit.
June 1.	In the neighbourhood of Monte Laziale (Lepiale?), near Rome.	Several shocks			Journ. des Débats, 13 Juin; Garnier, p. 185; Colla.
— — — — — 10. (O.S.) 6 ^h 30 P.M.	Petropawłowski in Kamtschatka.	A slight earthquake		The air calm and sky clear. Thermometer, 18°·3 R. Barometer, 29·95 inches (English or French?).	Dupetit-Thouvenin, Voyage de Vénus, part. Phys. t. ix. p. 444.

1.	2.	3.	4.	5.	6.
1837, June 21. Some minutes before 11 A.M.	Biebourg, Gutenberg, and Schwarzenbach, in Illern. Extended as far Schonstein in Svria.	A rather severe earth- quake, lasting some seconds.	.....	Preceded by a noise like the rolling of thunder...	Garnier, p. 186; Colla, Ann. Astr. 1839, p. 111.
July 26.	Island of Martinique	Several shocks.....	Accompanied by a terrible "raz de ma- rée."	During a dreadful hurricane	Journ. des Débats, 15 Sept.
Aug. 2.	Island of St. Thomas	.....	.....	Accompanying the tremendous hurricane which devastated the West Indies on this day. The account seems very doubtful.	Moniteur, 17 Sept.
At night.	Sydney and Newcastle in New South Wales.	.....	.....	Accompanied by a noise like the distant discharge of artillery.	Astoric Journal, N.S. vol. xiv. pt. 2. p. 29.
In the morn- ing.	3. In the island of Zante, same time in Cepha- lonia and various places in the Morea.	Some severe shocks.....	.....	Some damage done.....	Colla.
9. 4 ^h 30 ^m P.M. at Acapulco. 4 ^h 15 ^m at Morelia.	Acapulco, Morelia, and Mex.co.	At Acapulco the vi- bratory motion is said to have lasted a month almost un- interruptedly, the most severe shocks occurring nearly re- gularly at intervals of thirty or thirty- two hours. At Mex- ico the first shock only was felt. It was accompanied by slight undulatory motion. At More- lia there were two shocks with an in- terval of two se- conds, and accom- panied by oscilla- tions from N. to N.	.....	The buildings of Acapulco were greatly injured. At Morelia a violent tempest from the N.N.E. began at 4 ^h 30 ^m , accompanied by thunder and lightning. In the evening a great number of shooting stars were observed.	Dupetit-Thouars, Voyage de la V6- nus, t. ii. p. 214; Colla, Giorn. Astron. 1839, p. 111; Bull. de l'Acad. Roy. de Bruxelles, t. viii. pt. 2. p. 439.

1837. Aug. 21, 9 ^h 15 ^m A.M.	Piacenza in Italy	About the end of the month several shocks at Tortola. A slight undulatory shock from E.N.E. to W.S.W.	.....	Colla.
— 29.	Island of St. Vincent in the West Indies.	Several shocks .....	.....	Journ. des Débats, 22 Déc.
— Sept. 2. to 7.	Aivaly, and on the coast of the Gulf of Adra- miti, Anatolia.	Slight but continual shocks.	.....	Moniteur, 30 Sept.
— 4. 3 ^h 30 ^m A.M.	Milan	A shock, from E. to W. lasting two se- conds.	.....	Colla.
— 10 A.M.	Ario in Mexico. The origin apparently in the volcano of Jorullo.	The Gentle oscillation from S. to N.	.....	Bull. de l'Acad. Roy. de Bruxelles, t. viii. pt. 2. p. 438.
— 6.	Island of Barbadoes ...	Several shocks, one of which lasted twenty seconds.	.....	Journ. des Débats, 22 Déc.
— Night between 6 and 7. (N.S.)	Petropawlowski Kamtschatka.	A slight shock.....	Not felt on board the 'Vénus.'	Dupetit-Thouars, Voyage de la Vé- nus, t. ii. p. 25. et part. Phys. t. v. p. 173 et suiv.
— 19. 3 ^h 45 ^m A.M.	Eglisau in the canton of Zurich.	A very severe shock, consisting of a sud- den sharp jerk. Half an hour after, another slight shock.	.....	The second shock was accompanied by a dull rumbling noise.
— 22. 3 A.M.	Lasaya in Van Diemen's Land. Extended also to Maya on the coast of New Holland. (Where are these places situated?)	Violent and disastrous earthquake, which continued until dawn.	On the evening of the 21st terrible explosions were heard at Lasaya, and long luminous streaks of bright red were seen on the horizon; the whole sky then became of the same colour. During the earthquake the surface of the ground was in motion like that of the waves	M. Perrey's Memoir on Earthquakes in the basin of the Rhine, p. 94.

1.	2.	3.	4.	5.	6.
1837. Sept. 22 Noon.	Agam in Servia. Felt A violent shock from N. to S. in the neighbourhood and in the mountains.			of the sea, while every five minutes the explosions became terrible. The atmosphere was heavy, and was lit up by flashes of lightning. Lascaya and Maya were thrown down and filled with corpses. A terrible tempest at the same time.	Journ. des Débats, 9 Oct.; Moniteur, 10 Oct.; Colla, Ann. 1839; p. 112.
End of the month. — Oct.	Penang and Achcen in the East Indies.	The shocks lasted for seven days.		Accompanied by subterranean noise like thunder. Walls were cracked. Thermometer in the shade +15° Reaum. Barometer, 28' 4" 8" (Viennese).	Asiatic Journal, N. S. vol. xxv. pt. 2. p. 232.
— 5 A.M.	3. Vera Cruz	Several shocks.		Volcanic eruptions took place in the neighbourhood of Achcen.	Bull. de l'Acad. Roy. de Bruxelles, t. viii. pt. 2. p. 439.
— Afternoon.	4. Eglisau in the canton of Zurich. 6. Agau (in Croatia?)	A severe shock Severe shocks		Numerous shooting stars observed about this time at Guadalajara, 237 leagues from the shore of the Atlantic.	Méridien.
— 7 ^h 30 ^m P.M.	11. Tilly-la-Campagne, Bourguibus, and Solins, in the depart. Calvados.	Violent shock		Accompanied by explosions which recurred at intervals of half an hour. Low bellowing noises had been heard for several days. Many houses thrown down.	Journ. des Débats, 8 Nov.; Moniteur, 9 Nov.; Colla, Ann. 1839, p. 112.
— About 4 P.M.	18. Acapulco in Mexico. Felt also with considerable force at Mexico.	A violent earthquake, vibratory, lasting more than a minute in all its force. Up to 9 P.M., 130 shocks were counted. The shock of 4 P.M. lasted more than 2 $\frac{1}{2}$ minutes at Mexico.		Accompanied by loud explosions	Journ. des Débats, 18 Oct.; Colla.
— 0 ^h 30 ^m A.M.	19. Ditto	Another shock of extreme violence, followed in an hour by another still more		Everyone was roused by the second shock, which produced extensive ruins. Loud subterranean bellowings were heard during the whole night.	Dupetit-Thouars, Voyage de la Vé-nus, t. ii. p. 214; Moniteur, 15 Janv. 1836; Comptes Rendus, t. vi. p. 180.

1837. Oct. 19. Ditto. The shock at midnight was very severe at Mexico, but not of long duration. 10 P.M.	terrible than the former, and by alighter ones throughout the day. Two very severe shocks, followed by a third about midnight. The earthquake continued to tremble at intervals up to the 21st.	.....	Accompanied by ringing noises. The third shock threw the whole town into alarm.	Ditto.
20. Lisheard in Cornwall, and the country in the vicinity, both in Devonshire and Cornwall. 2 P.M.	.....	.....	Accompanied by a sound like the rattling of a cart.	Trans. Roy. Geol. Soc. of Cornwall, vol. v. p. 142 (note), quoting the Cornwall Royal Gazette Newspaper of 27th Oct. and 3rd of November 1837.
21. Acapulco 2 A.M.	Another shock, rather severe; the earthquake trembling until the next day at 10 A.M.	.....	.....	Authorities for Oct. 18.
22. Ditto 10 A.M.	Another severe shock. After this the earthquake was less disturbed; the shocks recurred periodically at 10 P.M., midnight, 6 A.M., and 4 P.M., for twenty days without ceasing. All the oscillatory movements were from W. to E. up to the 12th of November, after which time they recurred with more force at the same times as before, but in the opposite direction, or from E. to W. In	No perceptible elevation or depression of the waters of the sea was produced by any of these shocks.	.....	Ditto.

1837. Nov. 22. 11 ^h 58 ^m P.M.	Guadalajara in Mexico. Also felt, a quarter of an hour later, at Mexico.	Three shocks, from W. to E., very vio- lent.	.....	The origin was supposed to be in Cebo Rujo, a volcano to the west of Guadalajara. t. viii. pt. 2. p. 439.
— 24.	Camelford in Cornwall.	.....	.....	The account of October 27 probably refers only to this event. D. Milne's Catalogue, <i>loc. cit.</i>
— 30. 8 ^h 30 ^m P.M.	Island of Martinique ...	A severe shock	.....	The temperature was high; it had been cool for several days before. Comptes Rendus de l'Acad. t. vi. p. 302.
— Dec. 8. 11 ^h 15 ^m P.M.	Stamford in Lincoln- shire, and the country for twenty miles round.	Ditto	.....	Journ. des Débats, 23 Déc.
— 11. 3 ^h 7 ^m A.M.	Chalabre and S ^{te} Co- lombe in the departm. Aude. A slight shock was also felt at several places in the Arrière and Pyrénées Orien- tales.	A shock of thirty se- conds' duration.	.....	Accompanied by a noise like that of carriages rolling over pavement. Ditto; 18 Déc.; Colla, <i>loc. cit.</i>
1838. Jan. 5. 7 ^h 15 ^m and 7 ^h 30 ^m A.M.	Belley in the departm. Ain.	Two pretty distinct shocks, each lasting a second.	.....	Accompanied by loud noise Colla, Ann. Astr. 1840.
— to 14.	Spoletto and the neigh- bourhood, States of the Church.	Very violent shocks...	.....	Some persons asserted that they had seen flames issue from the earth. Colla.
— to 23.	Acapulco in Mexico ...	During this period (while the Vénus was in the port of Acapulco) thirty- four very slight shocks were felt, and one of some- what greater seve- rity.	.....	During this period the declination needle was carefully observed, but showed no symptom of disturbance in consequence of the earthquake shocks. Comptes Rendus de l'Acad. t. ix. p. 330.
— 11. — 14. 7 A.M.	Bucharest Tynehead in Northum- berland.	An earthquake A shock of sufficient force to throw down articles of furniture.	.....	Ditto, t. vi. p. 900. The next day a rent was remarked in the fields of more than half a mile in length, which was supposed to have been caused by the earth- quake. Milne, in his Catalogue of British Earthquakes, gives the date January 21 for this one. Journ. des Débats, 25 Janv.; Colla, Ann. Astr. 1840, p. 106.

1838. Jan. 24. Pouilly, Toisy, and Mont-St.-Jean, in the departm. Côte-d'Or.	undulatory and of longer duration. A slight shock.....	.....	.....	Journ. des Débats, 16 Fév.; Colla, Ann. Astr. 1840.
— 24 & 25. Ismail, Bender, Reni, &c. in Bessarabia.	More shocks .....	.....	.....	Pfieninger, Jahrsbericht über die Witterungs-Verhältnisse in Würtemberg.
— Night between 24 & 25. Odessa.....	Slight shocks .....	.....	It was remarked that the barometer, which had been in motion for several days, was much more agitated during these shocks.	Authorities for Jan. 23.
— 25. Bucharest and Jassy ... 4 A.M.	Another shock, instantaneous and very slight. Shocks were frequent during the last few days in Austrian Galicia, Transylvania, Hungary, Moldavia, Albania, Wallachia, and Bessarabia.	.....	.....	Ditto.
— Feb. 2. In the valley of Pastusie, Sardinia. At night.	Great subterranean commotion.	.....	Accompanied by an explosion which threw everything, minerals and vegetables, to a distance. Part of the ground disappeared in fissures. Bells sounded of themselves. Perhaps not an earthquake proper at all.	Journ. des Débats, 31 Mars.
— 10. Cronstadt in Transylvania, and the places near.	Some very slight shocks.	.....	During the inundation of the Danube at the end of the winter (some persons said) an earthquake occurred at Pesth. Journ. des Débats, 31 Mars; Moniteur, 2 Avril.	Colla, Ann. Astr. 1840, p. 106, 107.
— 14. Foligno and the neighbourhood, States of the Church.	A severe shock, followed by several slighter ones in the course of the day.	.....	.....	Colla.

1.	2.	3.	4.	5.	6.
1838 Jan. 15 About 5 ^h 30 ^m r. m.	Gibraltar	Several slight shocks, in the direction of the walls of the fortress (?). At 10 ^h 28 ^m , a prolonged and very distinct shock, and at 11 ^h 15 ^m , a very slight one.			Colla, Giorn. Astron. 1840, p. 106.
— 21.	Island of Martinique	A slight shock.			Communication of M. Colla to M. Perrey.
— 22	Tschiu, Russia (Bosna?)	A violent vibratory shock.			Flüeninger, Jahrbuch über die Witterungs-Verhältnisse in Würtemberg.
— 23	In Transylvania, and at Cronstadt and in parts of Turkey and Russia. The motion does not seem to have extended to the Asiatic side of the Bosphorus.	In Transylvania the shocks lasted a minute and thirty seconds. At Odessa and in Russia they were very violent. At Constantinople there were two shocks, the first vertical, the second horizontal and in the direction of the meridian (which is that of the Bosphorus near Therapia). At Orsova in Hungary the shocks were violent. At Odessa there were two, one vertical and the other horizontal, from N.W. to S.W.	In Transylvania the buildings first rocked from side to side, with a motion like that of a balloon, and then the walls cracked and fell. At Constantinople the air was calm during the shocks, but the north wind which had been blowing a little before recommenced soon after. At Scutari the shocks were accompanied by a violent wind. At Hermannstadt, a barometer, not fixed to the wall, but suspended, oscillated for more than half an hour. At the same place and at Cronstadt the sky was clear before the earthquake, became clouded at the time, and cleared again afterwards. At Bucharest the serenity of the atmosphere was not disturbed. At Orsova in Hungary the shocks were accompanied by terrible subterranean bellowings and by flames issuing from the earth. At Clusofka also subterranean noise was heard, like the rolling of a huge waggon over pavement.	Comptes Rendus de l'Acad. t. vi. p. 244; Journ. des Débats, 13, 16, 26 et 27 Fév.; Colla, Ann. Astr. 1840 pp. 106, 107; Les Steppes de la Mer Caspienne. t. i. p. 104.	
— 23	Cronstadt and all Transylvania, at 8 ^h 31 ^m P.M. At Odessa, at 9 ^h 11 ^m . At Constantinople, at 9 ^h 35 ^m . At Clusofka near Cherson, at 10 P.M.				

1838. Jan. 24.	Ponilly, Toisy, and Mont-St.-Jean, in the departm. Côte-d'Or.	Chotin they lasted four minutes. At Clarofka near Cher-son there were two shocks, the first vi-bratory, the second undulatory and of longer duration. A slight shock.....	.....	Journ. des Débats, 16 Fév.; Colla, Ann. Astr. 1840.
— — — 24 & 25.	Ismaïl, Bender, Reni, &c. in Bessarabia.	More shocks .....	.....	Pfieninger, Jahrsbericht über die Witterungs-Verhältnisse in Würtemberg.
— — — Night between 24 & 25.	Odessa	Slight shocks .....	.....	It was remarked that the barometer, which had been in motion for several days, was much more agitated during these shocks.
— — — 25. 4 A.M.	Bucharest and Jassy ...	Another shock, in-stantaneous and very alight. Shocks were frequent du-ring the last few days in Austrian Galicia, Transylva-nia, Hungary, Mol-davia, Albania, Wal-lachia, and Bes-sarabia.	.....	Ditto.
— — — Feb. 2. At night.	In the valley of Pastusie, Sardinia.	Great subterranean commotion.	.....	Accompanied by an explosion which threw every-thing, minerals and vegetables, to a distance. Part of the ground disappeared in fissures. Bells sounded of themselves. Perhaps not an earthquake proper at all.
— — — 10. 4 ^h 55 ^m A.M.	Cronstadt in Transylva-nia, and the places near.	Some very alight shocks.	.....	During the inundation of the Danube at the end of the winter (some persons said) an earth-quake occurred at Pesth. Journ. des Débats, 31 Mars; Moniteur, 2 Avril.
— — — 14. 8 ^h 30 ^m A.M.	Foligno and the neigh-bourhood, States of the Church.	A severe shock, fol-lowed by several slighter ones in the course of the day.	.....	Colla, Ann. Astr. 1840, p. 106, 107.
			.....	Colla.

1.	2	3.	4.	5.	6.
1838, Feb. 14 4 ^h 30 ^m a.d. 6 ^h 30 ^m p.m.	Dijon	Two slight shocks		Accompanied by a violent explosion. M. Perrey, Memoir of M. Perrey on Earthquakes although living at Dijon, says that he himself in France, Belgium, and Holland, neither felt the shocks nor heard the noise. p. 84.	
15.	Polignac	Another shock, more violent than that of the day before.		Colla.	
1 ^h 30 ^m a.m.		Another severe shock.		Ditto.	
8 ^h 45 ^m a.m.	17 Ditto				
20	Naples	Slight shocks		No damage done. Vesuvius was in a state of Ditto; Journ. des Débats, 13 Mars; rest. On the 21st from noon to midnight Montieur, 14 Mars.	
to 24.				magnetic perturbations were observed at Milan.	
23.	In the departm. de la Creuse	Two shocks		Colla, Ann. Astr. 1840.	
Between 4 & 5 a.m.					
Night between Fe-bruary 28 and March 1.	Night Lashon	A severe shock		Accompanied by thunder and lightning, hail, rain, Ditto, p. 107. and wind.	
March 5	Eglisau and Rheinu- canton of Zurich	A severe shock			Mérian.
9 ^h 30 ^m a.m.	15. In Hungary, the Bannat, Transylvania, and Wallachia.	Violent shocks		Pfeninger, Jahrbereicht über die Witterungs-Verhältnisse in Würtemberg. Colla, Ann. Astr. 1840.	
About 1 a.m.	16 Collentz	A shock		During a very violent tempest	
1 p.m.	17. Shrewsbury and the neighbourhood, extending about nine miles from that town, chiefly in a south or south-east direction. Felt in the villages of Meole, Hanwood, Dor-rington, Longden, Pontesbury, &c.	A very distinct and alarming vibratory shock.		Accompanied by a rumbling noise, like that of a train of waggons passing along a paved street. Houses, walls, articles of furniture, &c. shook violently. In some of the coal pits the men were so much alarmed that they came up out of the pits. Bells rang, bricks fell from a chimney, &c. Milne in his Catalogue gives a shock on the 27th at 1 p.m., at this same place, but in all probability the account only refers to the event of the 17th.	
	In Hungary, the Bannat, Transylvania, and Wallachia.	Violent shocks		Pfeninger, Jahrbereicht über die Witterungs-Verhältnisse in Wür-	

1838. May 5. 10 ^h 40 ^m P.M.	Genoa. Also felt at Piacenza.	A very distinct shock, which recurred at 11 ^h 35 ^m.	.....	.....	Colla.
— 22. 7 A.M.	Meandre in the departm. Isère.	Severe shocks, lasting nearly fifteen minutes, but in three separate sets.	.....	Some walls were cracked	Journ. des Débats, 3 Juin; Colla, Ann. Astr. 1840.
— 26.	In the district between Halle and Eisleben in Prussia.	Some subterranean commotions <i>suggested</i> to have been felt.	.....	A dull sound was heard, which according to some persons was subterranean.	Plieninger, Jahrsbericht über die Witterungs-Verhältnisse in Würtemberg.
— ...	Constantine on the north coast of Africa.	An earthquake .....	.....	.....	Colla, Ann. Astr. 1840, p. 108.
— June 7. 11 P.M.	Island of Meleda in the Adriatic.	Two slight undulatory shocks, from W. to E., lasting two seconds.	.....	The first shock was preceded by a slight murmuring noise which ended like the report of a cannon.	Colla.
— 23. At Venice, 10 ^h 18 ^m P.M. At Pesaro soon after 9 ^h 45 ^m .	Venice and Pesaro. Extended, with even more force than at the latter place, along the coast to Fano and Sinigaglia.	At Venice, three slight shocks, from E. to W. The second immediately succeeded the first, but there was a short interval between these and third. Total duration = 8 seconds. At Pesaro the shock was undulatory, from E. to W., and lasted five seconds.	.....	At Venice accompanied by dreadful weather; torrents of hail and rain. At Pesaro, a little before the earthquake, many shooting stars were observed, rather brilliant and of large size. They came from the east, and disappeared about the meridian towards the south. At 9 ^h 45 ^m a noise like that of four or five “voitures du poste” was heard, followed immediately by another sound, like that which a compressed gas makes in escaping, and, soon after, the earth began to tremble. All the buildings shook to their very foundations. Soon after the earthquake the water rose four French feet in the wells.	Comptes Rendus de l’Acad. t. vii. p. 89, t. viii. p. 344; Moniteur, 1 Août; Colla.
— July 1. 2 ^h 15 ^m A.M.	Constantinople	A slight shock.....	.....	.....	Colla.
— 18. 11 ^h 45 ^m P.M.	Gibraltar	Shocks.....	.....	.....	Ditto, Ann. Astr. 1840, p. 109.
— 19. 4 P.M. and 8 ^h 45 ^m P.M.	Ditto	Ditto. Direction = E. to W.	.....	.....	Ditto.
— 23. 3 ^h 44 ^m A.M.	Constantinople, and the country for several leagues round.	Two shocks, the latter of which was very violent. Total du-	.....	.....	Moniteur, 21 Août.

1.	2.	3.	4.	5.	6.
1838, July 30, Tureff in Scotland. (Where is this place?)		ration, 16 seconds. Horizontal undulations from N. W. to S. W. (?)			
— Aug. Night between 2 & 3.		A shock..... A slight shock.....		Probably this account and that of the 6th of August only refer to one and the same event. Etina was in a state of energetic eruption. There was an eruption of Vesuvius also during the first few days of the month, accompanied by some shocks. During the night numerous shooting stars were observed.	Communication of M. Pheisinger to Mr. Percy. Journ. des Débats, 21 Août; Colla.
— 6 p.m., and during the following night.	4. Huatusco in Mexico.	Several shocks.....			Bull. de l'Acad. Roy. de Bruxelles, t. viii. pt. 2. p. 440.
— 5 a.m.	5. Tureff in Scotland. (Where is this place?)	A very slight shock.....			Colla, Giorn. Astron. 1840, p. 109.
	7. Constantinople	A vibratory shock, lasting 8 seconds, followed at 5 ^h 7 ^m by another shock, of longer duration, after which slight but frequent oscillations were felt for a quarter of an hour.			Colla.
— In the afternoon.	9. Fiume and Bukkari on the Adriatic.	A slight shock..			Ditto; Journ. des Débats, 26 Août.
— 2 ^h 30 ^m a.m.	10. Ditto	Several shocks..			Ditto.
— Between 8 & 9 p.m.	Ditto. All these shocks were felt at Trieste.	A shock of greater severity than any of the preceding.	Vessels in harbor; bells sounded of themselves at the Fiume. At Bukkari the great tower of the church fell. A terrible noise preceded the shock.		Al. Ditto.
— 25.	In the county of Zolander (Szalad?) in Hungary.	A very violent earthquake. The shocks	Accompanied by noise like thunder. In some places, much damage was done, as at Riva.		Débats, 17 Sept.; Colla.

1838. Sept. 14. According to M. Colla, 9 A.M.	temberg in Styria. In the counties of Neutra and Comorn only some very short slight shocks were felt.	rapidity that they could not be counted.	.....	waters of the Mur were agitated and troubled, and threw a great many small fish up on the bank.	Journ. des Débats, 18 Sept.; Colla, Giorn. Astron. 1840, p. 110.
— — — 27. The shocks continued for three-quarters of an hour, and the last occurred at 4 ^h 5 ^m A.M.	At sea, in 31° 40' N. lat., and 44° 30' W. long. (doubtless from Paris).	A strong vibratory shock. The houses trembled for more than half a minute.	A violent shock, lasting thirty seconds, was felt on board <i>la Claudine</i> of Havre, followed by two others not quite so severe, separated by several slight ones of five or six seconds duration, very often repeated, and at intervals of about five minutes. The weather was clear and fine, and the sea nearly calm. No visible motion of the latter could be perceived.	The noise accompanying each shock was exactly that of distant thunder. The whole crew was roused and came on deck, thinking that the ship had struck.	Comptes Rendus de l'Acad. t. viii. p. 32; v. Leonhard, Taschenbuch für Freunde der Geologie, 1846. S. 210.
— — — 29. About 1 ^h or 9 ^h 5 ^m P.M. (?)	Messina and the neighbourhood.	A strong undulatory shock.	.....	To the west the shock was so severe that the inhabitants passed the night out of doors. On the 29th and 30th the eruption of Etna was more energetic than ever.	Journ. des Débats, 29 Oct.; Colla.
— — — Night between Sept. 30 & Oct. 1.	Ditto	Ditto	.....	.....	Ditto.
— — — Oct. 9. 2 P.M.	At sea, in 27° 37' N. lat., and 31° 7' W. long. (probably from Paris).	.....	Three slight shocks felt on board <i>la Claudine</i> , vid. Sept. 27.	.....	Authorities for Sept. 27.
— — — 14. 7 A.M.	Coblentz	A violent and almost instantaneous shock.	.....	From the 11th to the 14th the barometer had gone down from 28 in. 4·2 lines to 27 in. 6·6 lines (French?). On the 13th a remark-	Journ. des Débats, 20 Oct.; Colla.

1.	2.	3.	4.	5.	6.
1838, Oct 17 In the valley of Elsa, Tuscany, to 22		The earth during this period was in a state of continuous agitation. By night the tremblings and by day the noises (thom-bi) never ceased. Shocks like those of 1804 frequently recurred during the autumn.		able fall of the barometer at Parma, the wind being high and impetuous. On the 14th and 15th the temperature also fell considerably at the same place. But trifling damage done	Pilla.
4 th 49 ^m P.M. Nov. 26. At night. Dec. 7. 9 th 10 ^m P.M. Midnight.	26. Avenues in the departm. du Nord. At the chateau of Laupau in the canton of Brive. Crief in Scotland Zacumpan in Mexico 15. At Zurich	A very severe shock. Very slight subterranean commotion. A shock Direction N.N.W. to S.S.E. A slight shock			Coll. Giorn. Astron. 1840. Ditto. Milne's Catalogue, loc. cit. Great numbers of shooting stars observed for Ball. de l'Acad. Roy. de Bruxelles, t. viii. pt. 2. p. 440. Mérin.
16. In the departm. Isère.		During the period of slight shocks felt at St. Jean-de-Maurienne, earthquakes were also felt in this department. The most severe occurred on this day and on the 26th March following.			Mém. de Turin. 2 sér. t. ii. p. li.
19. St. Jean-de-Maurienne 10 th 20 ^m P.M. 23. Woodhouse Eaven on Charnwood Forest, Leicestershire.	19. St. Jean-de-Maurienne in Savoy. 23. Woodhouse Eaven on Charnwood Forest, Leicestershire.	A very severe shock. S.W. to N.E.			Comptes Rendus de l'Institut, t. xv. p. 1217. Proceeded by a rumbling noise like that of a heavy weapon.

1838. Dec. 23. In the middle of the night.	La Rochelle	A rather severe shock, lasting half a second.	.....	Accompanied by a noise like the report of a distant cannon. At several places in the de- partment doors were violently shaken.
1839. Jan. 11. 5 ^h 45 ^m or 6 A.M.	Island of Martinique. Also felt in Guada- loupe.	Very violent shocks, lasting 2 minutes; according to an- other account, two shocks, lasting 30 or 40 secs., appa- rently undulatory, and from S. to N. There were four other earthquakes before the 24th.	.....	A very great number of buildings thrown down, and people killed thereby. The wind was N.W., and the island entirely enveloped in clouds and vapour, a state of the atmosphere very unusual at this season. (Perhaps this cloud may have arisen only from the falling houses, which are said to have sent up a vast cloud of dust.)
— 12. — In the morn- ing.	Berlin, particularly in the northern part of the city.	Very distinct shocks..	.....	.....
— 14. — 9 P.M.	Suddeeah in Upper As- sam.	Apparently from S.W. to N.E.	.....	.....
— 17. — 4 ^h 45 ^m A.M.	Milan	A shock <i>indicated</i> by the magnetic needle.	.....	.....
— — — During the night (of 16-17?).	Salonica	Violent subterranean movements.	.....	.....
— 21. — 6 A.M.	Island of Sainte-Lucie in the West Indies. Also in Martinique.	Severe and prolonged shocks, lasting 35 seconds.	.....	.....
— — —	St. Mary, one of the Scilly Isles.	A shock .....	.....	.....
— Feb. Night between 7 & 8.	Near the village of Bak- likli, 15 wersts west of Bakou in the Cau- casus.	Violent subterranean commotions extend- ed to the distance of 30 wersts.	.....	.....
— 10. — 8 ^h 30 ^m A.M.	Aigueperse, Riom, and Gannat, in the de- partm. Puy-de-Dôme.	A violent shock .....	.....	.....
— 25. — 7 A.M.	Borgotaro in Tuscany...	A very distinct shock.	.....	.....
— 27 — to June 16.	St. Jean-de-Maurienne in Savoy, and the sur-	Forty-nine shocks were felt during this	.....	.....

1.	2.	3.	4.	5.	6.
rounding district, including 32 communes. It was remarked that the left bank of the Arc was more severely shaken than the right.	period, of which nine were rather severe and the remainder moderate or slight, besides twenty or twenty-five scarcely perceptible, or local. Another observer reckoned seventy-four shocks. They lasted in general but a few seconds, often consisted of two or three very distinct successive oscillations, and were chiefly in the direction N.W. to S.E. at St. Jean-de-Maurienne. At St. Sorlin-d'Arves and Fontcouverte they were supposed to come from the W., and at Albiez-Jeanne from the S. or E.	Two shocks, with an interval of some seconds. Shocks from N.W. to S.E.	The people in a canal boat felt the shock, and heard the noise reverberating among the hills.	those of a heavy carriage passing over pavement, a violent storm, an avalanche of snow, and distant thunder. This noise seemed to pass from N.W. to S.E., or W. to E. The more severe of these shocks produced cracks in walls in some of the communes, and articles of furniture were violently shaken about. During the principal shocks the atmosphere was obscured by a kind of fog or mist, which soon after dissipated itself. After the shock of the 26th March, which was the most severe, the hot springs of Maurienne increased in quantity of water, their temperature rose, and the water, usually limpid, was troubled. A carefully compiled catalogue of these shocks by M. Billiet is to be found in M. Perrey's 'Mémorial on Earthquakes in the Basin of the Rhone,' p. 57. The summer of 1839 was remarkably dry in Savoy, no rain falling for eighty days, and scarcely any sign of atmospheric electricity manifesting itself; but in September extremely heavy rains set in, which produced inundations in many of the Swiss valleys.	Colla. Métan.
1839. Mar. 12. 10 P.M.	Paterno ..	Two shocks, with an interval of some seconds. Shocks from N.W. to S.E.			Colla.
6 ^h 15 ^m and 7 ^h 25 ^m P.M.	17. In the Upper Engadine, Switzerland.	Shocks from N.W. to S.E.			Colla.
3 ^h 15 ^m A.M. At Klingensie, between 2 & 3 A.M.	Glengarry in Inverness-shire.	Very severe shocks.			Métan.
				Doorn were lifted off the latches. The Monitor and Colla give the date March 27.	D. Mitne's Catalogue, loc. cit.; Monitor, 5 Avril; Colla, Giorn. Astron. 1841, p. 153.

1839. Mar. 21 to April 1.	San Salvador-de-Guatemala.	Very violent shocks, especially on the 21st and 27th.		A mountain fell, burying beneath its ruins an entire village with all its inhabitants, and dammed up the course of a river. The earth opened, even in the town itself. The inhabitants fled to the open country to avoid being crushed under the walls which fell in all directions. The incessant agitation of the ground and terrible subterranean noises led them to expect the opening of a volcano.	Colla, Giorn. Astron. 1841, p. 153.
— 22. In the morning.	In Styria	An earthquake			Lamont, Annalen für Meteorol. u. Erdmagn. 1842, Heft 1. S. 160.
— 23. 2 A.M. According to Silliman's Journal, between 3 & 4.	Amurapoorah and throughout the Burmese Empire, extending more than 1000 miles from N. to S.	Two violent shocks from E. to W. at the hour mentioned, followed by slighter ones up to 8 A.M., and feeble tremblings for a year after. The direction of the shocks is also given as N. to S., or <i>vice versa</i> .		Preceded by loud rumbling noise. Huge fissures of 10 to 20 feet in width, and running from N. to S., opened in the ground, from which vast quantities of water and black sand were thrown out, flooding the plains. Volcanic eruptions on the same day in the hills to the south of Kyouk Phyou.	Asiatic Journal, N. S. vol. xxix. pt. 2. p. 288; Silliman's Journal, vol. xxxviii. p. 385.
— 26.	In the department of the Isère, in the canton of Oisans, at Allemont, Auris, &c.	Frequent shocks during the period of the earthquakes at St. Jean-de-Maurienne. The most severe were on the 16th Dec. 1838, and 26th March 1839 (the day of the most severe shock in Maurienne). The motion was from N.E. to S.W.		The shocks were always preceded by a noise like distant thunder or the fall of an avalanche.	Mém. de Turin, 2 sér. t. ii. p. li.
— April 3. 6 ^h 30 ^m A.M.	Grenoble	A slight shock from E. to W., lasting 2 secs.			Colla, Giorn. Astron. 1841, p. 153.
— 4.	St. Ambroise near Turin.	A shock			M. Billiet in Mém. de Turin, loc. cit.

1.	2.	3.	4.	5.	6.
1847. April 5 3 P.M.	.....	An undulatory shock from S. to N., followed by another of less intensity, which was again succeeded by a severe shock "en soubresaut." Total duration = 6 or 7 sec. At 6 ^h 45 ^m a very slight shock at 9 ^h 30 ^m another; and two more during the night.	.....	Preceded by a very loud noise, which lasted about 3 seconds. After the shocks the sky became clouded over, and in the evening very dense clouds formed in the N.W., extending in the form of stratus towards the S.E.	Colla; Lamont, <i>Annales für Meteor. u. Erdmagn.</i> Heft 1. S. 160.
.....	7. In Switzerland ..	.....	.....	.....	M. Billiet in <i>Mém. de Turin</i> , loc. cit.
.....	8. Entgegen in the canton of Berne.	A severe earthquake shock.	.....	.....	M. Studer's Catalogue.
.....	11. Interaken in the same canton.	.....	.....	.....	Ditto.
.....	14. At Algiers. Felt rather more strongly in the upper part of the town than in the lower part near the sea. Also strongly felt at Constantine, especially in the centre of the town.	A general vibration violently shook all the houses of the town. It lasted two or three seconds.	The shock was felt on board vessels in port.	Immediately preceded by a subterranean noise, in the direction S.E. to N.E. (?). Some already ruinous walls fell. At the moment of the shock the atmosphere was calm and the sky clear, with a very gentle breeze from the S.E. The preceding night there had been an extraordinary storm, which seemed to be confined to the lower strata of the atmosphere, and was accompanied and followed by abundant showers of hail. At Oran and Bona a terrible tempest, with a frightful sea, prevailed on the 11th, 12th, and 13th, but the earthquake was not perceived at either of these places.	<i>Comptes Rendus de l'Acad.</i> t. viii. p. 763; <i>Journ. des Débats</i> , 29 Avril
May 8. Between 11 P.M. and midnight.	In the Bernese Oberland, and the Emmenthal, Switzerland.	A shock from N.W. to S.E.	.....	.....	Mérian.

1839. May 10. After mid-night (of the 9th?)	Again in the Bernese Oberland.	Another shock	.....	Ditto.
— 11. At Jamulpoor, at 9 ^h 30 ^m A.M.	Jamulpoor, Comercolly, and Sylhet, in North-eastern India.	Direction at Jamulpoor = W. to E., or N.W. to S.E.	.....	Asiatic Journal, N. S. vol. xxx. pt. 2. p. 15.
— At Comercolly, 9 ^h 50 ^m ; and at Sylhet, 9 ^h 55 ^m .				
— 20.	In Calabria	Shocks	.....	Lamont's Annalen für Meteor. u. Erdmagn. Heft 1. S. 160.
— 22. 11 A.M.	Bridgewater in Scotland (Somersetshire?), and the country for sixteen miles round.	A very distinct shock	.....	Moniteur, 30 Mai; Colla, Giorn. Astron. 1841, p. 154.
— 24. 2 A.M.	Glasgow and environs, and Crieff in Scotland.	Two strong shocks, each of which lasted two seconds, at Crieff.	.....	Ditto; Milne's Catalogue, loc. cit.
— June 3. 8 P.M.	Suddeeah in Upper Assam.	Apparently from S. to N.	.....	The season had been unusually wet from March up to this time. The small-pox was prevalent. Soc. Bengal.
— 7. 2 A.M.	Island of Meleda in the Adriatic.	Slight undulatory shocks from S. to N.	.....	Colla.
— 9. 6 ^h 36 ^m A.M.	Island of Antigua	Violent subterranean commotion, followed the next morning by a slight shock.	.....	Ditto, Giorn. Astron. 1841, p. 154.
— 11.	North of Manchester	A shock	.....	Milne's Catalogue, loc. cit.
—	In the mountains of Albano, near Rome.	Shocks	.....	Lamont's Annalen für Meteorol. u. Erdmagn. Heft 1. S. 160.
— 12. 8 ^h 15 ^m A.M.	In Lancashire, and especially north of Manchester.	A slight shock. According to M. Plieinger, several shocks in Lancashire.	.....	Colla, Giorn. Astron. 1841, p. 154; Communication of M. Plieinger to M. Perrey.
— 16. 8 A.M.	Choapam in Mexico	A slight shock, from W. to E. (?)	.....	Many shooting stars were observed about the time (in June). Bull. de l'Acad. Roy. de Bruxelles, t. viii. pt. 2. p. 441.

1.	2.	3.	3.	5.	6.
1839 June 20 About 4 P.M. — July 13 9 A.M.	Sagorbe in Valencia, Spain. Oaxaca in Mexico	A shock of two seconds' duration. No distinct shocks, but a very violent undulatory motion, from S. 10° W. to N. \). Lasted one to two minutes.	Accompanied by subterranean and distant rolling noise. Many shooting stars observed on the 10th	Moniteur, 15 Juillet. Bull. de l'Acad. Roy. de Bruxelles, t. viii. pt. 2. p. 441.	
— Aug. 2 2 ^h 25 ^m A.M.	Island of Martinique	Three severe shocks of twelve or fifteen seconds' duration. The motion was sharp, jerking, and horizontal from N.E. to S.W.	The weather had been dry since the earthquake of the 11th of January, but the rain began immediately after this one, during suffocating heat.	Colla, Giorn. Astron. 1841, p. 164; Comptes Rendus, t. ix. p. 415; Moniteur, 12 Sept.; Journ. des Débats, 27 Sept.	
— 8 A.M. — About 2 ^h 20 ^m P.M.	7. Annecy in Savoy Lucca	A slight shock. A strong undulatory shock, from N.W. to S.E., lasting three seconds.		Colla, Giorn. Astron. 1841, p. 165; M. Billiet, loc. cit. Colla	
— 3 ^h 30 ^m and 10 ^h P.M. — 8 A.M. — 9 ^h 30 ^m A.M.	8. Annecy in Savoy Ditto Brescia	Two more shocks, slight. Another slight shock. A very severe shock.		Colla and M. Billiet, loc. cit. Ditto. Colla Colla and M. Billiet, loc. cit.	
— 8 P.M. — 6 ^h 30 ^m P.M.	11. Annecy in Savoy 16. Ditto (On the same evening a slight shock at Geneva.)	A severe shock Ditto		Colla and M. Billiet, loc. cit. Ditto.	
— 8 A.M.	18. Irkutsk in Siberia	Three shocks, one of which was severe enough to throw		Colla, Giorn. Astron. 1841, p. 166.	

1839. Aug. 27. About noon.	Reggio in Calabria	the N.W. A very severe shock, lasting about six seconds.	.....	.....	Colla; Lamont's Annalen für Meteorol. u. Erdmagn. Heft 1. S. 160; Journ. des Débats, 18 Sept.; Moniteur, 19 Sept. Ditto.
— 1 ^h and some minutes P.M.	Messina	A shock, followed by two others at 5 and 8 P.M., and by a third, of two seconds' duration, at 9 ^h 30 ^m . "Mouvement par soubresauts." Three minutes afterwards another slight shock. Direction of the shocks = S.E. to N. (?)	.....	Accompanied by a noise like that of a strong wind. At the moment of the shocks the air assumed a reddish or roseate tinge, as was observed at Parma on the 12th and 13th of March 1832. The wind blew steadily from the N.W.	
— — —	Annecy in Savoy. None of the shocks recorded at this place were felt in Maurienne.	Two more shocks .....	.....	.....	Colla and M. Billiet, <i>loc. cit.</i>
— — — 28 and 29.	Messina and Reggio	Three more shocks. That on the 28th at 5 ^h 30 ^m (A.M. or P.M.?) was the most severe.	.....	.....	Authorities for the shocks at Messina on the 27th.
— — — 30 and 31.	Ditto	Two more shocks .....	.....	.....	Ditto.
— Sept. 2. 1 A.M.	Bristol, Newport, Cardiff, and other places in S. Wales, and at Shrewsbury. Felt most at Kingsdown.	A very severe shock .....	.....	East of Bristol, beds rocked, crockery was thrown down, and doors were opened. M. Plieninger gives an earthquake as felt in Monmouthshire and all the West of England on the 8th at 1 A.M., but the date is no doubt erroneous.	Colla, Giorn, Astron. 1841, p. 156; Lamont's Annalen, Heft 1. S. 160; Milne's Catalogue, <i>loc. cit.</i>
— At night.	In a great part of Monmouthshire.	A severe shock of some seconds' duration.	.....	Followed by a loud explosion. Probably only the same event as that recorded on the 2nd.	Colla, <i>loc. cit.</i> ; Lamont's Annalen, <i>loc. cit.</i>

1.	2.	3.	4.	5.	6.
1839. Sept Night between 20 and 21.	Island of Martinique . . .	A slight shock.			Colla, <i>loc. cit.</i> ; Quételet, 2 ^e Mé- moire sur les Eclipses Flantes, p. 57.
— 23 the autumn.	Island of Jamaica . . .	An earthquake shock			Ditto.
— Between and 8 p.m.	After Kingston in Jamaica . .	A severe shock		Accompanied by noise like distant thunder. Perhaps this account refers to the event of the 25th of September.	Colla, <i>loc. cit.</i>
— Oct. Night between 1 and 2.	San Salvador de Guate. . .	A formidable earth- quake. Forty-eight shocks were count- ed in twenty-four hours, and others followed on the en- suing days up to the 10th.		All the buildings were seriously injured, and some entirely thrown down. Most of the in- habitants fled to the open country. The town was rendered uninhabitable.	Ditto.
— 4 to Dec. 28.	St. Jean-de-Maurienne in Savoy, and the sur- rounding distr. &c.	During this period forty-nine principal shocks were felt, and many more in- distinct ones which were not recorded. They generally oc- curred in groups, several at a time. M. Colla reckons forty from the 6th to the 28th Decem- ber, of which four were severe, twelve moderate, and twenty-four slight.		From the 16th June to the 4th October the shocks had ceased at St. Jean-de-Maurienne, but they now began again. The list of in- vidual shocks by M. A. Billiet is given in Parrey's 'Mémorial on Earthquakes in the Basin of the Rhone', p. 61. They were generally preceded or accompanied by subterranean noise, and sometimes this noise was heard without any sensible shock. After the shock of the 11th December, at 3 ^h 25 ^m A.M., about two minutes later, the horizon appeared bril- liantly lighted, so that one could easily distin- guish the objects in a room.	Mémorial of M. A. Billiet, <i>loc. cit.</i> ; Colla, Giorn. Astron. 1841, p. 157.
— 17 10 ^h 25 ^m P.M.	Gratz in Styria . . .	Violent shocks, from S.W. to N.E., last- ing 4 sec.			Colla, <i>loc. cit.</i> p. 136; Lamont's Annalen, <i>loc. cit.</i>

1839. Oct. 21 to 26.	Reggio in Calabria	Sixty-two shocks during the period mentioned, twenty-six of which were severe, the others moderate or slight. A rather severe shock. The intensity varied very much at different places, and was greatest at Comrie in Perthshire. The lines of equal intensity are said to have nearly formed ellipses, of which Comrie was the centre, and of which the longer diameter ran N.E. and S.W., or parallel to the Grampian chain. In and near Comrie there were several distinct undulations, apparently from W. to E. or N.W. to S.E., followed by a trembling or vibratory motion. In more distant places only this trembling was felt. Different persons supposed the ground to be raised from 2 to 6 or 8 inches. The angle made by the wave with the horizon appeared to be at	..... The river Earn is said to have appeared to stand still for an instant during some of the shocks. Water in some other places was also seen in a state of agitation.	The most severe shocks were accompanied by a loud and prolonged noise.	Ditto. D. Milne in Jameson's Edinburgh New Philosophical Journal, vol. xxxv. p. 137; <i>Vide</i> also other vols. referred to below.
22. Smyrna	Throughout the whole region affected the shock seems to have been felt simultaneously, viz. at about 10 ^h 30 ^m P.M.	.....	Accompanied by a very loud noise, variously spoken of as subterranean and aerial, and compared to the loudest thunder, artillery, the blowing up of a magazine, wind amongst the trees, &c. This noise lasted 20 or 30 secs. One person observed the branches of some trees all bent towards the east, as if a strong gale were blowing on them. After they had recovered their erect position not a leaf stirred, but during the time a hollow <i>sugh</i> was heard in the air like the draught of a furnace; this continued about 20 secs. after the concussion. At Comrie greater injury of walls, displacement of furniture, and other similar effects were produced than in other parts of the country. On the following day a strange black scum was found on the ground. A similar phenomenon had been remarked several times before on Loch Earn, and occurred again in February and March 1841. A strange kind of sulphurous odour is said to have been perceived in some places, and several persons experienced a feeling of nausea. An electrical discharge was supposed to take place at the time of the shock. Aurora borealis and shooting stars were more frequent than usual in September and October. The weather was very wet, and the barometer, already low, fell for some hours before the shock.		

1.	2.	3.	4.	5.	6.
1839, Oct	Con R. 1. Portl shire	<p>Alloa 1° 18' and in the Curie of Falkirk 3° 47'. The shock seemed to be perpendicular at Comrie. Others appeared to have occurred at some places within an hour or two after.</p> <p>Shocks were felt on Oct. 3, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 to 22, 23, 24, 25, 26, 27, 28, 29, 30 and 31. The principal one, the most severe of all those felt at Comrie, was on the 23rd of this month, at 10^h 30^m P.M. The character of the shocks was sometimes that of a sudden sharp blow, sometimes undulatory, and sometimes vibratory or tremulous. The direction of the whole series of shocks at Comrie seems to have been most generally E. and W., or N.E. and S.W.</p>		<p>The long-continued series of slight shocks felt at Comrie which here commence have been carefully recorded by Mr. Milne, and it is on his authority, and that of the Reports to the British Association, that the dates and other particulars are given in this Catalogue, from which other accounts occasionally differ. As the shocks were generally of so local and slight a character, they are only noticed once at the end of each month in which they occurred; the separate notice of each shock would give them undue importance in a general catalogue of earthquakes. The shocks were in general very slight, but sometimes rather severe; and were generally accompanied by subterranean noises, variously described as like distant thunder, the reports of artillery, the sound of a rushing wind, &c. The noise sometimes seemed to be in the air, and was often heard without any sensible shock at the time. Several shocks were often felt each day. The shocks were generally felt further N.E. and S.W. of Comrie than in any other direction. In one house of the town, built on a rock, they were much less felt than in any other in the neighbourhood. The weather was generally wet and drizzly, and the rivers were frequently and suddenly flooded. A thin frosty</p>	<p>Papers by D. Milne in Jameson's Edinburgh New Philosophical Journal, vols. xxxii. xxxiii. xxxiv. xxxv. and xxxvi.; Philosophical Magazine, vol. xi. p. 242; British Association Reports, 1841, 1842, 1843, and 1844; M. Perrey's Catalogue of Earthquakes in the British Islands, quoting chiefly communications from Mr. Macfarlane of Comrie.</p>

1839. Nov. 2. About 4 p.m.	Geneva.....	A slight shock. Some instants after, a strong shock felt at Sion.	.....	On the whole most numerous and severe in the month of October. There does not seem to have been any connexion between those at Comrie and those occurring this year at St. Jean-de-Maurienne in Savoy.	Colla, Giorn. Astron. 1841, p. 157.
— 3.— 2 a.m.	Sion in the Valais	Another rather strong shock.	.....	.....	Ditto.
— 8.— 3 a.m.	Coire in the Grisons ...	A shock from S.W. to N.E.	.....	.....	Mérian.
— 25.—	Rome	A vibratory shock .....	.....	.....	Quételet, 2 Mém. sur les Étoiles flantes, p. 57.
— ...	Comrie in Perthshire ...	Shocks were felt on Nov. 1, 2 to 8, 9, 19 to 28, 29 and 30.	.....	.....	Authorities for October.
— Dec. 11. Before 1 a.m.	Zürich	A vibratory shock .....	.....	.....	Mérian.
— 17.— 6 a.m.	Berne .....	.....	.....	.....	Ditto.
— 24.—	On the coast of Dorset- shire.	A strong vibration ...	.....	Attended by a sinking of the ground (landslip?).	Communication of M. Plieninger to M. Perrey.
— ...	Comrie in Perthshire ...	Shocks on Dec. 2, 3, 4, 5, 6, 7, 8, 11, 12, 13 to 18, 20, 24, 28 and 31.	.....	.....	Authorities for October.
1840. Jan. 2 to March 18.	St. Jean-de-Maurienne in Savoy, and the sur- rounding district.	The shocks still con- tinued in this di- strict. Ten were felt during the pe- riod mentioned, two of which were of moderate intensity, and all the others slight.	.....	The list of days on which these shocks occurred is given by M. Perrey in his 'Memoir on Earthquakes in the Basin of the Rhone.'	Memoir of M. A. Billiet, <i>loc. cit.</i>
— 5.— A little before midnight.	In the Pyrenees	An earthquake .....	.....	Chimneys were thrown down. Four days be- fore, a strong smell of sulphur had been per- ceived, accompanied by subterranean noise, at Bagnères de Bigorre.	Moniteur, 12 Janv.; Colla, Ann. Astron. 1841; Écho du Monde Sav. No. 509.

1840. Jan. 25. Clagenfurth in Carinthia. A shock of earthquake.	.....	.....	.....	.....	Communication of Signor Colla to M. Perrey.
— 26. In Silesia.....	.....	.....	.....	During a tempest	Plieninger, Jahrsbericht über die Witterungs-Verhältnisse in Würtemberg.
— 31. Parma and Guastalla ...	.....	.....	.....	.....	Colla.
Some minutes before 8 P.M.	.....	.....	.....	.....	.....
— ...	.....	.....	.....	The weather still very wet.....	Authorities for October 1839.
— Feb. 1 and 2. Guastalla in Northern Italy.	.....	.....	.....	.....	Colla.
— 14. Island of Ternate .....	.....	.....	.....	Preceded by a volcanic eruption on the 2nd.	Asiatic Journal, N.S. vol. xxxii. pt. 2. p. 325.
At night.	.....	.....	.....	.....	Colla; Gazette Piém. 20 Mars.
Night between 19 and 20.	.....	.....	.....	.....	.....
— 26. Cabul .....	.....	.....	.....	.....	Asiatic Journal, N. S. vol. xxxii. pt. 2. p. 104.
At night.	.....	.....	.....	.....	.....
— 29. Parma, and, at the same instant, at Lucca.	.....	.....	.....	.....	Colla; Gazette Piém. 20 Mars.
About 2 ^h 15 ^m A.M.	.....	.....	.....	.....	.....
—
— ...	.....	.....	.....	.....	Colla.
— ...	.....	.....	.....	.....	Authorities for October 1839.
— Mar. 4. 1 P.M. Suddeeah in Upper Assam.	.....	.....	.....	Preceded by a total eclipse of the sun about an hour before, during which the air was unusually cold, and disagreeable even to nauseas.	Quart. Journ. Geol. Soc. 1845. p. 142, quoting Journ. Asiat. Soc. of Bengal.

1.	2.	3.	4.	5.	6.
1st 10 Mar 10 M At night.	Arriving in the canton of Berne, Switzerland.	A slight shock.			Mérian; Quetelet, Ann. de l'Observ. de Bruxelles, 1843.
Between 11 p.m. and mid- night.	12 Ditto	Two severe shocks from S.E. to N.W., followed by a slight one a quarter of an hour later.		The Allgemeine Schweizer Zeitung and M. Stue- der's Catalogue give the date as the night be- tween the 13th and 14th, 1 A.M.	Ditto.
13. Berne				Perhaps only the same with the last. On the 11th, 12th, and 13th, there were storms in the kingdom of Naples; and on the 14th and 15th magnetic disturbances at Prague, and on the 15th at Milan.	On Communication of M. Colla to M. Perrey.
Night be- tween 16 & 17. About midnight.	Messina	A distinct shock fol- lowed by a slight one at 4 A.M.			Colla.
22 4b 17 th P.M. (At Guérande. 3 ^h 30 ^m).	Nantes, Guérande, and some of the district to the west, departm. Loire-Inférieure	At Nantes two shocks, separated by an in- appreciable interval. At Guérande, a shock from E. to W.			Moniteur, 28 Mars.
8 ^h 15 ^m P.M. At night.	Anancy in Savoy. Not felt in Maurienne. 23. Annemasse, Aya, Tar- nant, and many neighbouring villages, Burmah.	A violent earthquake. Lasted two or three minutes at Annem- se.		On the 22nd and 23rd, a magnetic perturbation at Prague. The cities and villages are said to have been almost destroyed and about 300 persons killed.	Memoire of M. A. Billiet, loc. cit.; Colla, loc. cit. 1842, p. 91. Edinburgh New Phil. Journ. vol. xxxvi. p. 364.
	Comrie in Perthshire	Shocks felt on March, 8, 9, 11, 13, 14, 21, 24, 25, and 27.			Authorities for October 1839.
April 5.	Montrond near St. Jean- de Maurienne, Savoy.	Two shocks. They became weaker as they passed from E. to W.		At Lyons, Roquemaure, and Perpignan, a violent thunder-storm on this day.	'Notes Additionnelles' to M. Per- rey's Memoir on Earthquakes in the Basin of the Rhone, p. 21.
Between 10 & 11 P.M.	25 Skrawaka in Austrian Poland. Felt also at Vagel and Western.	Three shocks in two minutes.			Communication of Sig. Colla to M. Perrey; Lamont's Annalen für Meteorol. u. Erdmagn. 1 Heft, p. 111.

or Switzerland?).							25th of March).
30. In the Carpathian Moun-							Ditto.
tains.							
Comrie in Perthshire ...						The shock of the 7th was strongly felt at Crieff.	Authorities for Oct. 1839.
May 2. In Dalmatia						A shock of earthquake	Quételet, Ann. de l'Observ. Roy. de Bruxelles, 1843.
Comrie in Perthshire....						Shocks on the 19th and 22nd of the month.	Authorities for Oct. 1839.
June 3. St. Jean-de-Maurienne						A rather severe shock,	Communication of M. A. Billiet to M. Perrey.
5 ^h 20 ^m A.M. in Savoy.						apparently the last of the long series at this place.	
8. Tours and Candes in the						A vibratory shock ...	Lamont's Annalen für Meteorol. u. Erdmagn. 1 Heft, S. 161.
department Indre-et-Loire.							
11. Athens.....						Ditto	Colla.
20 The whole district of A						In a few moments the whole aspect of the country in the neighbourhood of Mount Ararat was changed. The shocks gave the earth a movement resembling waves. Numerous fissures opened, all parallel to the rivers Araxes and Arpatchai; the earth was ploughed up to the distance of a werst from the beds of the rivers, and the fissures were seen to open and shut every moment in accordance with the motion of the earth. There occurred also a great number of vertical explosions from the bottom of holes like little craters, which, opening and closing like the fissures, cast up immense quantities of wafer mixed with sand and gravel. Numbers of the springs were dried up for some time, and continued for several days after to yield only thick and whitish coloured water; others became more abundant than they had been. The first four and most formidable shocks were accompanied by a subterranean noise. Numbers of buildings were cracked and so much injured that they fell on the oc-	Edinburgh New Philos. Journ. vol. xxxvi. p. 364; Moniteur, 25 Sept., 8 Oct., 23 Nov.; Phalange, 30 Sept.; Majocchi, Annali di Fisica, &c. t. viii. p. 292; Lamont's Annalen, 1 Heft, S. 161.
to July 28 (O.S.). 6 ^h							
45 ^m P.M. At							
Tiflis, at 7 ^h							
10 ^m (P.M.?).							
At Erivan, at							
7 ^h 30 ^m .							

1.	2.	3.	4.	5.	6.
1846, July 2 O.S. of N.S. At sunset	The whole district of Mount Ararat in Armenia.	Lasted about a minute.		<p>currence of the subsequent shocks. Great damage was done by landslips from Mount Ararat, large masses of rock, ice and snow descending upon the valleys below.</p> <p>Vast masses of rock were thrown down from the mountains. Probably given according to New Style, and referring to the event of June 20, Old Style. M. Pieninger gives this date also, and states the hour as 6^h 45^m P.M. He says many houses were thrown down at Nachitschewan, and that some damage was done at Schuscha, but at 8^h 6^m.</p>	<p>Asiatic Journal, N. S. vol. xxiv. pt. 2. p. 120.</p>
— 7. Island of Bourbon in the Indian Ocean	An earthquake				Lamont's Annales, 1 lieft, S. 161.
— 14. District of Mount Ararat. O.S. 3 A.M. At Tiflis, at 2 A.M. In the morning.	Another violent shock. Felt at Tiflis and Erivan. 15 Naples District of Mount Ararat.				Authorities for June 20.
(27 N.S.) About 7 P.M.	Another of the violent earthquakes felt in this district. Lasted about a minute.			<p>A loud subterranean explosion was heard at the Colla. same time proceeding from Vesuvius.</p>	
— 25, Ditto O.S. 3 and 10 A.M., and 5 P.M.	More of these violent shocks.			<p>Terrible damage was done by the fall of a great mass of stones, ice, and melted snow from the mountain. Several of these great shippages seem to have taken place about this time, and devastated the country over a large area. 3000 houses were thrown down in the district of Schavour. Houses also fell in many other places, rocks were thrown down from the mountains, and many persons lost their lives.</p>	<p>Authorities for June 20.</p>
— 28. Tiflis	Another shock				Ditto.
					<p>Memoir on Earthquakes in the Caucasus by M. Philadelphie of</p>

<p>— 30. (O.S. or N.S.?)</p> <p>mont. District of Mount Ararat. Extended as far as Tiflis.</p> <p>— 31. Tiflis</p> <p>O.S. 3 A.M.</p> <p>Comrie in Perthshire</p>	<p>tion. Two severe shocks more.</p> <p>Shocks were noted on July 3, 11, 16, 17, and 23.</p> <p>Several shocks in one minute. The shocks continued, though but slightly, up to the 8th.</p>	<p>Authorities for June 20.</p> <p>Memoir by M. Philadelphine above quoted.</p> <p>Authorities for Oct. 1839.</p>
<p>— Aug. 2. In the Khanate of Talschyn, district of Mt. Ararat. Felt at Tiflis and Alexandropol.</p> <p>— (O.S. or N.S.?) 7 P.M.</p>	<p>No damage done. On the 6th another landslip from Mount Ararat took place, which did terrible mischief, the immense masses of rock, ice, and melted snow destroying or injuring numbers of houses, and leaving no trace of fields or gardens for a space of twenty wersts. The dates of these earthquakes of Mount Ararat are very confusedly reported, chiefly owing to the difference of style.</p> <p>Accompanied by a loud rumbling noise like thunder or that of a carriage. It seemed to pass from E. to W., or according to others, from N.E. to S.W., or N.W. to S.E. The atmosphere was very severe and bright.</p>	<p>Silliman's Journal, vol. xxxix. p. 335; Trumbull's History of Connecticut, vol. ii. p. 92.</p>
<p>— 9. Connecticut and the neighbouring states. Felt at Hartford, Milford, Newhaven, Bridgeport, Derby, Waterbury, Middlebury, Woodbury; in Massachusetts, but not at Weyfield or north of Litchfield. More strongly felt at Washington, very severe at Worcester, slight at Middleton, and not at all felt at Boston.</p> <p>— 27. In Styria, Illyria, and Lombardy.</p> <p>0^h 52^m P.M.</p>	<p>At Chester there were fifteen or twenty shocks reckoned, in the direction N.W. to S.W. (?). Duration, half a minute.</p> <p>In Styria an undulatory shock from S. to N. At Venice a very distinct shock, lasting 5 secs., undulatory, from S. to N.</p>	<p>In Styria much damage was done. Therm. at Venice 24° 9 C. Bar. 28 in. 4 lines (French). The atmosphere was partly obscured by mist.</p> <p>Communication of M. Colla to M. Perrey.</p>

1.	2.	3.	4.	5.	6.
1840 Aug. 10. Courcelle Pertuisare.		Stocks on the 5th and 6th.			Authorities for Oct. 1839.
Sept. 2. Roma are in Langue. Two shocks, from E. to W., with an interval of five minutes.	Also felt at Châtillon, Cadore, Alghero, St. Germain, Tavel, and Saunette.			Accompanied by loud subterranean explosions. Moniteur, 12 Sept.; Voleur, 18 Sept. Colla.	
6. Port-au-Prince in St. Domingo.					Gaz. de Milan, 26 Juin, 1841.
10. Hamilton in Upper Canada.		A violent shock. The Pieces of water were violently agitated as if by a storm.		Accompanied by loud subterranean noise. Build- ings were violently shaken.	Moniteur, 19 Oct.; Gaz. de France, 19 Oct.; Phalange, 23 Oct.; Colla; Giorn. Astron. 1842. p. 93.
19. Different places in the Kingdom of Naples. Felt at Sorra, Chieti, the whole of the Abruzzo Citeriore, and especially in the district round Monte-Magella.		Shocks which recurred for several days. During the night, two were felt at Sulmona, one consisting of a sharp blow; the other undulatory.		Accompanied by a dull noise.	Colla; Lamont's Annalen, loc. cit.
Oct. 18. Fernires in the territory of Parma.		Shocks on the 19th, 21st, and 26th.			Authorities for Oct. 1839.
19. Near Mitterfels in Bavaria.		An earthquake.			Colla.
27. St. Fox-lea-Lyon.		A slight shock felt by some people.		The same day, magnetic perturbations at Parma, Munich, Prague, Milan, and Brussels. An aurora borealis was seen at Parma and in France. An extraordinary fall of the barometer took place in many parts of Europe.	Quétinet, Annuaire, 1843, p. 290; Lamont's Annalen, loc. cit.
About 9 P.M.				After a violent tempest at Lyons, which began about 7 and ceased about 9 P.M. The weather was terrific at Toulon, Marseilles, &c.	roy's Memoir on Earthquakes in the Basin of the Rhone, p. 21.
28. Island of Zante.		Violent shocks, especially on the 30th. Followed in the course of a week by about 100 shocks.	The Lord High Commissioner, who was in a steamboat at the time, and within six miles of land.		Edinburgh New Philos. Journ. vol. xxxvi. p. 365; Phalange, 27 Nov. es 2 Dec.; Lamont's Annalen, loc. cit.; Lombard's Taschenrechner.
30. On the 30th, in the middle of the day.					

1840. Oct. 31. After mid-night of the 30th.	Altnau in Thurgovia ...	A strong shock, which awakened many people.	.....	.....	into the sea. This shock was the most destructive of buildings ever felt in Zante. On the 29th an aurora borealis was seen at Brussels. On the 1st of November, magnetic disturbances at Prague, and on the 1st and 2nd at Munich.	Mérian; Quételet, Annuaire, 1843.
.....	Comrie in Perthshire ...	Shocks recorded on the 4th, 20th, and 26th. The shock of the 26th moved the instruments, by which vertical motion to the extent of half or three-quarters of an inch, and horizontal motion towards W. by N. to the extent of half an inch, seemed to be indicated.	.....	.....	.....	Authorities for October 1839.
Nov. 5.	Various places in Calabria.	.....	.....	.....	.....	Colla; Écho du Monde Sav, Nr. 587.
3 A.M.	6. In the Saxon Voigtland. Felt at Aarau.	Shocks. At Brambach there were three, rapidly succeeding each other, from N.W. to S.E. Followed at 1 ^h 20 ^m P.M. by another shock, of greater intensity, and in the same direction. At 6 P.M. there was another, very severe; and several slight ones occurred during the following night. A rather violent shock, from N.W. to S.E., followed by two oscillations.	.....	.....	Accompanied by noise like thunder	Lamont's Annalen, loc. cit.; Communication of M. Plieninger to M. Perrey.
6 ^h 53 ^m A.M.	8. Bessas and Barjac in the departm. Gard.	.....	.....	.....	.....	Quotidienne, 18 Nov.; Phalange, 22 Nov.; Colla, Giorn. Astron.

1.	2	3.	4.	5.	6.
1840 Nov 11 Philadelphia At night.	— A severe shock	Accompanied by a great and unusually sudden swell in the Delaware.			Edinburgh New Philos. Journ. vol. xxxvi. p. 365.
— 9 P.M. — 25. New Haven in Connecticut. — 25. Nachtehrwan in Arme- nia, and the neigh- bouring districts. — 6 P.M.	A shock ... A vibratory shock, which lasted forty seconds.		Accompanied by noise	No damage done.	Silliman's Journal, vol. xl. p. 375. Quételet, Annuaire. 1843; Pfleu- ger, Jahrbuch über die Witter- ungs-Verhältnisse in Wurtem- berg. Pflünger, <i>loc. cit.</i>
— 26 Ditto	Two more shocks, slight			Houses were thrown down in the circle of Seharus.	Ditto.
— 29, Ditto. More violent in the circle of Seharus.	The oscillations re- current more or less slightly up to De- cember 7, O.S.				Authorities for October 1839.
— Dec Night between 9 and 10.	Belley in the depart- ment of Ain. Felt in several communes on the banks of the Rhone.	Shocks were felt on November 12, 13, 16, and 24.		No damage done.	Moniteur et Gaz. de France, 19 Déc; Phalange, 23 Déc; Gaz. Piém. 14 Déc; Colla, Giorn. Asur.
— 10. Chambery in Savoy	A strong shock from E. to W.			Probably the same with the last. It is remarked that shocks had been pretty frequent in the sub-alpine regions for fifteen years before.	Ditto.
— 1 st 18 th A.M.	On the eastern shore of the Black Sea.	An earthquake shock			Lamont's Annales, <i>loc. cit.</i>
— 1 st 24 th A.M.	Clagenfurt, in Carni- thia. Also felt at Fer- lach in Swabia.	A shock, from S.W. to N.E., lasting two or three seconds.		Accompanied by noise like the rolling of a car- riage.	Moniteur, 17 Janv. 1841.
— 6 th 37 th P.M.	Coenza in Calabria	A severe shock, last- ing about fifteen minutes (?).			Phalange, 27 Janv. 1841; Lamont's Annales, <i>loc. cit.</i>
— 6 th 30 th A.M.	Smirna, and Pyrgus in the Peloponnese.	A violent shock			Gaz. Piém. 26 Janv. 1841; Lamont's Annales, <i>loc. cit.</i>
— ... Courie in Perthshire	Shocks noticed on De-				Authorities for October 1839.

night.		S.W. The shocks came from the Calabrias, and not from Etna.			
— 4. —	Ditto	More shocks	.....	.....	Ditto.
— 6. —	Ditto	Ditto	.....	.....	Ditto.
— 15. —	At Algiers	Shocks at these hours	.....	.....	Lamont's Annalen, 1842. S. 161; Colla, Not. Météor.
In the morning and at noon.					
— 21. —	Malta	A distinct but only momentary shock.	.....	.....	Colla.
— About 2 A.M. —					
— 25. —	In the State of New York.	Shocks which lasted fifteen or twenty seconds. Direction = W. to E.	.....	Accompanied by a noise like that of loaded waggons.	Comptes Rendus, t. xii. p. 440; L'Institut, Nr. 376; Colla, Giorn. Astr. 1842, p. 95; Ann. de l'Observ. de Bruxelles, t. iii.
In the morning.					
— 31. —	Caermarthen, and several other towns in Wales.	A smart shock, accompanied by a very visible tremor of the earth.	.....	Accompanied by a rumbling noise similar to the sound of distant thunder. It is to be observed that a shock occurred at Comrie in Perthshire at about 2 A.M. on the same morning. Similar shocks are said to have been observed about the preceding month of November in the neighbourhood of Llanstephan.	Jameson's Edinburgh New Philos. Journ. vol. xxxvi. p. 76.
Between 3 and 4 A.M.					
— — —	Comrie in Perthshire	Shocks were felt on the 6th, 18th, and 31st.	.....	.....	Authorities for October 1839.
— Feb. 3. —	Eglisau in the canton of Zurich.	A vibration felt beneath the feet as if heavy bodies had fallen under ground.	.....	From the 1st to the 5th magnetic perturbations at Cracow, and on the 2nd at Naples.	Mérian; Studer.
7 P.M.					
— — —	Zurich	A vibratory shock	.....	This account is considered doubtful by M. Perrey.	Communication of M. Colla to M. Perrey.
— — —	Gowhatty in Upper Assam.	Sharp and stunning, as if a blow had been struck under the jaw.	.....	Accompanied by a low rumbling noise. In this month a splendid meteor was seen all through Upper Assam.	Quart. Journ. Geol. Soc. 1845, p. 142, quoting Journ. Asiat. Soc. of Bengal.
or 11.					

1.	2.	3.	4.	5.	6.
1841. Feb. 15. Oporto in Portugal ... In the morning.	A shock	A shock			Lamont's Annales, Heft 1. S. 162; Quetelet, Annuaire, 1843, p. 293.
5 and 11 P.M. Night between 20 and 21. About 7 P.M.	Cenosa Various places in the kingdom of Naples. Island of Zante	Slight shocks at the hours mentioned. Very severe shocks A most alarming shock of earthquake. The vibration continued from thirty to thirty-five seconds. The shocks afterwards recurred daily.		On the same day there fell three showers of red rain. Preceded by three days and nights of incessant rain with a violent gale of wind. Though of longer duration than the shock of the preceding October, this did much less damage, but a few houses being thrown down, and some others injured.	Comptes Rendus de l'Acad. t. xiii. p. 215. Moultier, 13 et 28 Mars; Lamont's Annales, loc. cit.; Colla.
	Island of Martinique	Shocks.			Edinburgh New Philos. Journ. vol. xxxvi. p. 366, Lamont's Annales, loc. cit.; L'Institut, Nr. 382.
Mar. 6 1 P.M.	Course in Perthesire near Naples. The centre of disturbance seems to have been Casa-Micciola.	Shocks on the 1st, 14th, and 16th. A severe shock, lasting some seconds, and followed, six minutes after, by a slighter one.			Colla; Ann. de l'Observ. de Bruxelles, t. iii. Authorities for October 1830
11 ^h 30 ^m P.M. 17. 19 Feb ^{ry} 30 ^m A.M.	Athens Constantinople Fe ^{by} sin in the cañon of Zurich.	A vertical shock Two shocks A much stronger shock than that of February 3, and felt over a larger district. Ten minutes later, another slighter shock.		Some damage was done at Casa-Micciola	Colla; Lamont's Annales, loc. cit.
					Lamont's Annales, loc. cit.
					Dübo. Mérion; Studer.
In the evening.	Island of Lipari. The west coast of Sicily was also slightly	A vibratory shock, the most violent recorded by the			Moniteur, 18 Avril; Colla.

1841. Mar. 22. 6 ^h 34 ^m A.M.	Coblentz, along the Moselle between that town and Treves, up the Rhine as far as Camp in the Duchy of Nassau, and on the Lahn.	A shock of a second's duration, from N.E. to S.W.	.....	Accompanied by very loud noise. The steersman of one of the steamers declared that he saw a blue flame rise from a hill in the distance, which remained suspended in the air for a time, and then sank and disappeared upon the spot it rose from. On the 22nd and 23rd, magnetic perturbations at Parma, Munich, Geneva, Prague, Brussels, Toronto, and St. Helena, and on the 24th at Milan, Naples, St. Petersburg, and Catherinenberg. Meteors were observed at several places.	Moniteur, 28 Mars; Lamont's Annalen, Heft 1. S. 168; Edinburgh New Philos. Journ. vol. xxxvi. p. 367.
— — — 25.	In Georgia (Caucasus)...	Earthquake shocks on this day and the two next mentioned.	.....	.....	Quételet, Annuaire, 1843, p. 294.
— — — 26.	Ditto .....	.....	.....	Ditto.	
— — — 30.	Ditto .....	.....	.....	Ditto.	
— — —	In Calabria	More shocks .....	.....	.....	Lamont's Annalen, loc. cit.
— — —	Comrie in Perthshire ...	Shocks on March 6, 10, 11, 22, and 23.	.....	On the 10th the two inverted pendulums kept at Comrie had their points thrown half an inch to the west. On the 22nd these instruments were also affected, but not to the same extent.	Authorities for October 1839.
— — — April 1.	In Georgia (Caucasus)...	Earthquake shocks .....	.....	.....	Quételet, Annuaire, 1843, p. 294.
— — — 3.	Seiches in the departm. Maine-et-Loire.	A rather severe shock, from E. to W.	.....	Accompanied by subterranean noise.....	Moniteur, 13 Avril; Gaz. Piém. 21 Avril.
— — — About 1 P.M.	In Jutland, and Schleswig Holstein.	Severe shocks .....	.....	Houses were violently shaken, and chimneys were thrown down. The barometer remained in its ordinary condition.	Moniteur, 16 Avril; Colla, Giorn. Astron. 1842, p. 96.
— — — 3 ^h 30 ^m P.M.			.....	
— — — 13.	Port-au-Prince in St. Domingo.		.....		Colla; Ann. de l'Observ. de Bruxelles, t. iii.
— — — 5 ^h 30 ^m A.M., 11 A.M., and 2 ^h 30 ^m P.M.	Oban in Argyleshire ...	Shocks, which do not appear to have been felt at Comrie in Perthshire.	.....		Edinburgh New Phil. Journ. vol. xxxvi. p. 76.
— — — 21.	Ditto	Ditto .....	.....	The shock was felt severely at the Lismore light-house (103 feet high), which vibrated so as to cause the reflector frame and glasses of the lantern to tingle. The watcher heard a loud noise like that of a cannon discharged at a short distance. This noise was heard at the bottom of the light-house, but the vibration	Ditto.
— — — 1 ^h 35 ^m A.M.			.....	

1.	2.	3.	4.	5.	6.
1841. Apr 21 0 ^h 30 ^m P.M.	Athens	A slight shock, followed at 5 ^h 40 ^m by ten others, from E. to W. Later still, another shock of greater force.		was not felt there. The ferry-house at Connal (nine miles east of the light-house) was rent by the shock. No effect was produced on the barometer. A stiff breeze was blowing from the north.	Lamont's Annalen. 6 Heft, S. 221.
— 26. O.S. 1 P.M.	Tiflis in Georgia	A slight shock.		It was said that the town of Bayazid had suffered much injury.	
— 30. 11 P.M.	In Hungary from the Sea of Varna to Allendorf in Gallicia, where shock seems to have occurred also on the 26th. Came in Perthshire	A violent shock		Most damage done at Mengard and Tatra. Accompanied by a considerable fall of snow at Allendorf.	Memoir of M. Philadelphine on Earthquakes in the Caucasus. quoted by M. Perrey. Pflüger, Jahrbuch über die Witterungs-Verhältnisse in Würtemberg.
— May to 5.	In the district of Nakhichevan in the Caucasus.	Shocks were felt on April 3, 9, 12, 14, 17, 24, and 25.			Authorities for Oct. 1839.
— 9 P.M.	Village of Kewrag in same district.	A violent subterranean commotion, lasting five minutes. At Nakhichevan it was slight.		Accompanied by a deafening noise at Kewrag. Houses were thrown down. At Nakhichevan no noise was heard.	Moniteur, 8 Déc.
— 6. Ditto	...	More shocks			Ditto.
— 8. Ditto	...	Ditto			Ditto.
— About 3 P.M.	Monterey in California.	A very short and very slight shock.			Dudot de Mafra, Exploration de l'Oregon, t. ii. p. 56.
— 9 P.M.	Tiflis in Georgia	A very severe vibratory shock.		Accompanied by two loud subterranean explosions.	Memoir of M. Philadelphine on Earthquakes in the Caucasus.
— O.S. 3 A.M.					

— — — — —	Mazzara in Sicily. Some places in the kingdom of Naples. Comrie in Perthshire ...	to N. Shocks.....	.....	.....	nalen, <i>loc. cit.</i> ; Colla. Ditto.
— — — — —	June 1. Kingston in Jamaica ...	Shocks were felt on May 5, 8, 22, 26, 27, 28, and 30. An earthquake .....	.....	.....	Authorities for Oct. 1839.
— — — — —	5. Athens.....	Very severe shocks...	.....	.....	Edinburgh New Philos. Journ. vol. xxxvi. p. 367.
— — — — —	11 ^h 40 ^m A.M.	.....	.....	.....	Lamont's Annalen, Heft 6. S. 221.
— — — — —	8. Several places in the kingdom of Naples.	Strong undulatory shocks from S. to N.	.....	.....	Journ. des Débats, 12 Juillet; Moniteur, 20 Juillet; Lamont's Annalen, Heft 1. S. 160.
— — — — —	9. Ditto. Felt at Sulmona.	Ditto .....	.....	.....	Ditto.
— — — — —	10. Ditto. Felt at Lancrano. In Sicily also these shocks were perceived, but there they were of but slight intensity.	.....	.....	At Tarente houses were thrown down	Ditto.
— — — — —	12. St. Louis, near the junction of the Missouri and Mississippi.	An earthquake .....	.....	.....	Edinburgh New Philos. Journ. vol. xxxvi. p. 368.
— — — — —	4 P.M.	An earthquake, which recurred with greater severity at 5 ^h 25 ^m P.M.	.....	.....	Edinburgh New Philos. Journ. vol. xxxvi. p. 367; Journ. des Débats, 15 et 16 Juillet; Moniteur, 16 Juillet; Lamont's Annalen, Heft 1. S. 162; v. Leonhard's Taschenbuch, 1 Jahrgang, 1846. S. 205.
— — — — —	13. Ditto	Tremblings felt at short intervals during the day. A perfectly perceptible undulation.	.....	.....	Ditto.
— — — — —	14. Ditto	A vibrating and distinctly visible rocking motion. The ground then remained comparatively quiet up to	.....	A number of buildings were destroyed.....	Ditto.
— — — — —	4 A.M.	.....	.....	.....	.....
— — — — —	3 ^h 30 ^m A.M.	Ditto. Only some of the severer shocks were felt in the adjacent islands.	.....	The Villa da Praia de Victoria was reduced to a complete ruin. Not a single house or edifice escaped. Several villages in the neighbourhood were destroyed in the same manner. Every convulsion was preceded by a loud submarine or submarine noise, which exactly	Ditto.

1.	2.	3.	4.	5.	6.
1841, June 15	10 P.M. in Portugal	2 ^h 40 ^m A.M. on the 15th, when another violent shock was felt. Others were felt at intervals up to the 24th of the month.		varied in intensity with the force of the shocks. A rent of a mile in length was formed in the ground, extending from the shore. The soundings around the island were not altered.	
—	10 Several places in the Kingdom of Naples.	A vibratory shock ... Strong undulatory shocks from S. to N. They continued to be felt at Salmons up to the end of the month.			Quételet, <i>Annuaire</i> , 1843, p. 295. <i>Moniteur</i> , 20 Juillet; <i>Journ. des Députés</i> , 12 Juillet; Lamont's <i>Annales</i> , Heft I. S. 160.
—	11 P.M. ... 11. Tübingen and Rhenish, in the canton of Soleure	Several shocks		Accompanied by rolling noise from S.W. to N.E. Mérian.	
About 10 A.M.	29 In the departm. Indre.	A shock followed by a second in a few minutes. Both extremely slight.		Accompanied by a sharp and prolonged subterranean noise.	Vid. authorities for July 5.
11 ^h 15 ^m and 25 ^m (A.M. or P.M.?).	30 Châtillon-sur-Indre, and Buzançais.	Shocks		Accompanied by loud subterranean noise.	Ditto.
—	—	—		—	—
—	—	A single shock on the 29th.		—	—
—	1. C. Toulon sur-Indre, and Buzançais	Another shock		—	—
—	Bayard in Georgia.	—		—	—
—	—	—		—	—
2 ^h 7 ^m P.M.	3 Monterey in California. Felt in the farm in the interior.	Another shock. There were four oscillations, horizontal, from N. to S.		—	—
About 9 ^h 30 ^m	4. Kinlochmoidart in Argyllshire.	A slight shock.		—	—

Authorities for October 1839.

Authorities for July 5.

Gazette de France, 21 Août.

Dufot de Mafras, *Exploration de l'Océan*, t. II. p. 56.

The town was swallowed up in consequence of an earthquake. This account requires confirmation.

Preceded by a terrible noise like the increasing roll of thunder, which lasted about twenty seconds. Meteorological and magnetical instruments were not affected. Earthquakes are said to be frequent in California.

Accompanied by rumbling noise

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1841. July 5. Over a large part of Cen-
tral France. The prin-
cipal places where the
earthquake was felt
are noted in the other
columns.

Accompanied at Bourges by a loud noise, as if a
heavy load had been thrown down in one of
the upper stories. At Caumacré the noise was
compared to that of a dozen diligences rolling
together over the pavement. In the evening
it was remarked that the upper clouds were
impelled by a south wind and the lower by a
north. At Pont-Levoy a deep heavy sound
was heard; articles of furniture shook; the
wind was very strong, and it rained heavily.
At Quincy the noise was compared to that of
carriages on a pavement, or the rolling of distant
thunder. Near Nogent-sur-Vernisson the sky
was clouded but calm, and the heat suffocating.
At Rambouillet the noise was very loud; the
sky was calm, but a storm was approaching.
In the department de l'Indre a clock which
had been stopped in February 1840, and had
been left so, was again set in motion by this
earthquake, and struck the hours. No effect
of any note was produced on the instruments
of the observatory at Paris. At Genesee
(Seine-et-Oise) and Orleans, where the shocks
were felt, the weather was lowering, and the
atmosphere seemed charged with electricity.
At Marseilles on the 14th and Cette on the
17th extraordinary movements of the sea were
observed.

At Leblanc-sur-Indre.....
the shocks were se-
vere enough to
shake the furniture
of the houses vio-
lently. At Bligny-
sur-Ouche, three
shocks equally
strong. At Bourges
a kind of heaving
motion; there were
two shocks, follow-
ed by a third, very
slight, one at about
3 A.M. At Cauma-
cre, a severe shock
from N. to S., last-
ing two or three se-
conds. At Langé
the most severe
shock at 0^h 28^m
was followed by a
second four or five
minutes later, by a
third at 3^h 44^m,
and a fourth, very
slight, at 3^h 45^m;
apparent direction
= S. to N. At
Pont-Levoy, the
first shock was from
N. to S., and was
followed by another
at 3^h 30^m. At Quin-
çay the first shock
was severe, appa-
rently from W. to
E.; but the second
was of less force.
At Nogent-sur-
Vernisson, a violent

Early in the
morning. At
Leblanc-sur-
Indre, about
midnight of
the 4th. At
Bligny-sur-
Ouche, near
Arnay-le-
Duc, be-
tween mid-
night of the
4th, and 0^h
30^m A.M. of
the 5th. At
Bourges, 0^h
30^m A.M. At
Caumacré,
near Roche-
more, south
of Tours,
about mid-
night. At
Langé, can-
ton of Valen-
çay (Indre),
0^h 28^m. At
Pont-Levoy,
0^h 30^m. At
Quincy, S.
of Blois, at
0^h 30^m and
about 3^h 30^m.
Near No-
gent-sur-Ver-
nisson (Loi-
ret), 0^h 45^m.
At Chartres,
Longjumeau,
Grignon

1.	2.	3.	4.	5.	6.
<p>(Seine-et-Oise) Orsay, Sèvres, Meulan, and Paris, about 0^h 30^m A.M. At Doanemarie (Seine-et-Marne), 0^h 40^m. At Rambouillet, about 0^h 37^m.</p>		<p>shock from N. to S. objects were visibly set in motion. At Chartres, and Longjumeau, a severe shock. At Doanemarie, three severe shocks, apparently from S. to N. At Rambouillet, a violent oscillation from W. to E. At Grignon, a rather severe shock from N.E. to S.W. At Orsay seven shocks were counted; the first was the most severe and from S. to N. At Sèvres three shocks from W. to E. At Chevreuse a strong shock from N.E. to S.W. At Meulan, 3 shocks from N. to S. At Paris, also 3 shocks, general direction = N.E. to S.W.</p>			
<p>1841. July 8. In the kingdom of Naples</p>		<p>Shocks.....</p>			<p>Comptes Rendus, t. xiii. p. 449; Quotidienne, 6 Août; Colla.</p>
<p>— 10. Cosenza and Catanzaro</p>	<p>in same kingdom.</p>	<p>A severe shock</p>			<p>Ditto.</p>
<p>Midnight.</p>	<p>Vienna. More severe at Neustadt. Very slight at Gratz.</p>	<p>At Vienna, a slight shock consisting of three quick vibrations from N. to S. At Gratz the direction was also N. to S.</p>		<p>Unproductive of damage</p>	<p>At Neustadt buildings were injured</p>
<p>1st 34^m P.M.</p>					<p>Journ. des Débats et Moniteur, 27 Juillet; Lamont's Annalen, Heft i. S. 162, Heft 2. S. 178.</p>

1841. July 13. Potenza in the kingdom of Naples.	A slight shock.....	.....	Accompanied by a vibration in the air like that produced by a discharge of artillery. Several walls were thrown down.	Authorities for July 8.
— 15. In several parts of the bailiwick of Holbach, in Denmark. Also felt at Copenhagen.	An earthquake .....	.....		Moniteur, Journ. des Débats, Phalange et Quotidienne, 6 Août; Lamont's Annalen, Heft 1. S. 161; Colla, Giorn. Astron. 1842, p. 97. Authorities for July 8.
— 16. At Naples and various other places in the kingdom.	Shocks, which at Naples lasted twenty seconds. Direction = N.E. to S.W.	.....	Vesuvius sent forth a little smoke.....	
— 3 ^h 15 ^m P.M.	A slight shock.....	.....	.....	"Notes additionnelles" to M. Perrey's Memoir on Earthquakes in the Basin of the Rhone, p. 21.
— 17. St. Jean-de-Maurienne in Savoy.	.....	.....	.....	Lamont's Annalen, Heft 1. S. 162.
— 18. Gundelfingen in the Grand Duchy of Baden, and at Freyburg in the Black Forest.	Three shocks .....	.....	On the 17th, 18th, and 20th, magnetic perturbations at Cracow; on the 18th at Brussels; on the 19th and 20th at Toronto and St. Helena; and on the 20th at Munich. On the 17th and 18th storms and extraordinary heat in many parts of Europe.	
— 20. Guastalla in the Duchy of Parma.	A slight shock, lasting two seconds.	.....	.....	Colla.
— 11 P.M.	.....	.....	The principal shock was accompanied by a loud noise coming from the west. The heat was very great on the 17th and following days.	Moniteur, 2 Août.
— 22. Leghorn	Three shocks, one of which was very severe.	.....	.....	Moniteur, 17 et 19 Août; Phalange, 20 Août; Journ. des Débats, 16 et 17 Août; Lamont's Annalen, Heft 1. S. 163; Écho du Monde Sav. No. 661 et 25 Août; Colla, Giorn. Astron. 1842, p. 97; Quételet, Annuaire, 1843, pp. 296, 297.
— 30. Lisbon and Leira in Portugal.	Several shocks.....	.....	.....	Moniteur, 17 et 19 Août; Phalange, 20 Août; Journ. des Débats, 16 et 17 Août; Lamont's Annalen, Heft 1. S. 163; Écho du Monde Sav. No. 661 et 25 Août; Colla, Giorn. Astron. 1842, p. 97; Quételet, Annuaire, 1843, pp. 296, 297.
— In Westphalia.....	An earthquake .....	.....	.....	Quételet, Annuaire, 1843, p. 294.
— ... Comrie in Perthshire ...	Shocks were felt on July 2, 23, 25, 26, 30, and 31.	.....	The shocks on the 23rd, 25th, and 26th were rather severe, affecting the instruments to the extent of about half an inch. That on the 30th was still more violent, as, although the motion of the instruments was only about the same (half an inch), the effects on buildings were much greater; chimney-tops were broken, walls rent, &c. Trees vibrated from their very	Authorities for October 1839.

1.	2.	3.	4.	5.	6.
1841. Aug. 2. 10 P.M.	Lisbon and Leira in Portugal.	A slight vibratory shock.		The direction seems to have been N. to S. There were nine or twelve other shocks felt on the same day, and the principal one extended over a much greater area round Comrie than usual.	Authorities for July 30.
10 ^a 18 ^m (A.M. or P.M.)	Ditto	Another shock		No serious mischief is mentioned as having been done, but the inhabitants had taken flight in alarm.	Ditto.
— 4	Seville and Malaga in Spain.	Two severe shocks		The barometer was variable; it fell one line a quarter of an hour after the earthquake, and the weather, which had been excessively hot, suddenly changed to rain.	Phalange, 19 Sept.; Colla, Giorn. Astr.
— 5.	St. Pierre in the island of Martinique.	Strong horizontal oscillations from N.E. to S.W. There were three distinct shocks, of gradually increasing intensity.			Authorities for July 30.
10 ^a 42 ^m P.M.	Several places in Central Spain.	Shocks			Ditto.
— 6	Tangers in Morocco	Ditto		Accompanied by noise	Ditto.
— 7	Seville and several other places in Spain.	Several shocks			Ditto.
10 ^a 30 ^m P.M.	Messina	A severe shock, followed, two hours later, by two others.			Gaz. Piem. 10 et 15 Sept.
About 3 ^a 30 ^m A.M.	Parma	A slight shock; at once vertical and horizontal, from E. to W. Lasted about four seconds.			Ditto.
8 ^a 9 ^m P.M.	Island of Antigua	A shock, described as a sudden and severe jerk, with a short subsequent tremor.			Edinburgh New Philos. Journ. vol. xxvi. p. 371; Courier de la Côte-d'Or, 14 Oct.; Colla, Notice Meteorol. 1841, 42, 43, p. 9; Lamont's Annales, Heft 1. S. 163.
— 16	Islands of Sta Lucia, Martinique, and Guadeloupe.	In Sta Lucia a shock of appalling violence.		Preceded in 3 ^a Lucia by a house rumbling.	Ditto.

1841. Aug. 18. Castrovallari in the kingdom of Naples, and the environs. About 9 A.M.	loupe there were two violent shocks, and in Martinique two or three. A slight shock, lasting four seconds.	.....	.....	Gaz. Piém. 10 et 15 Sept.
— 24. Sulmona in the same kingdom. 4 A.M.	A slight undulatory shock.	.....	.....	Ditto.
— 25. Caramanico in the same kingdom.	Rather a severe shock.	.....	.....	Ditto.
— Comrie in Perthshire ...	Shocks felt on August 1, 10, 12, and 30, all very slight.	.....	.....	Authorities for October 1839.
— Sept. 1. Nijne-Tagilsk on the eastern slope of the Oural. Also felt at Tchernoe-Estolschinsk.	A shock from W.S.W. to E.N.E. A man who was fishing at the time said that the oscillation came from the N.	.....	.....	Moniteur, 8 Déc.; Bull. de l'Acad. de Bruxelles, t. ix. pt. 1. p. 188; Lamont's Annalen, Heft 1. S. 161; Colla.
— 6 A.M.	2. Carthago in the province of Costa-Rica, Central America. Also strongly felt in the United States.	.....	.....	Journ. des Débats, 16 Janv. 1842; National, 11 Déc. 1841; Lamont's Annalen, Heft 1. S. 163.

1.	2.	3.	4.	5.	6.
1841. Sept. 19. In Syria	An earthquake shock			completely thrown down had to be pulled down. From San-Joaë to Heredia and Alajuela the whole country was covered with ruins.	Communication of Signor Colla to M. Perrey.
and 20	19 Nauplia in Greece	Shocks on the two days mentioned.			Ditto.
	Comrie in Perthshire	Shocks recorded on Sept. 8, 9, 10, 16, 17, 22, 23, and 29.		The shocks during the night of September 9-10 were severe enough to move the instruments half or three-quarters of an inch. The weather for the two preceding days was remarkably wet and close.	Authorities for October 1839.
Oct 5	Constantinople	A strong vibratory shock			Colla; Lamont's Annalen, Heft 6. S. 221.
and 6. In the morning (of the 6th).	Island of St ^o Lucia	A slight shock			Quêtelet, Ann. de l'Observ de Bruxelles, 1843, p. 298; Lamont's Annalen, Heft 2. S. 193. Colla; Lamont's Annalen, Heft 1. S. 184.
3 ^h 45 ^m P.M.	9. Parma	A very slight shock, undulatory, from S.E. to N.W., lasting about 3 secs.			Authorities for Oct. 6.
	Island of St ^o Lucia	A slight shock.			Ditto.
13. Ditto		Ditto			Journ. des Débats, 20 Déc.; National, 4 Déc.; Lamont's Annalen, Heft 1. S. 163; Colla.
14 Monte-Leone in Calabria-Libra-Libra, and several other places in the kingdom of Naples.		A slight shock.			
8 A.M.					
2 ^h 30 ^m A.M.	15. Saugunnetto in the province of Verona.	The first shock, at the hour mentioned, was followed by another ten minutes later, by a third at 2 ^h 45 ^m , a fourth at 3 ^h 20 ^m .		Each of the shocks was accompanied by dull explosions, and a kind of hissing noise which seemed to pass rapidly through the air. The night was calm and the sky very clear. Numerous luminous streaks like those left behind by shooting stars were observed.	Colla.

1841. Oct. 16. 11 P.M.	Ditto		companied by un- dulation.			Ditto.
— — — — —	Wersen near Salzburg in the Tyrol.		Another slight shock.			Ditto; Communication to M. Perrey.
— — — — — 2 ^d 30 ^m P.M.	Torre-di-Passeri in the Abruzzo, kingdom of Naples. Felt also at some other places.	A very severe shock.		No damage done.....		Authorities for the 14th.
— — — — — Night between 20 and 21.	Reggio and Messina in Sicily.	At Reggio, a violent shock. Still strong- er at Messina.			Ditto.	
— — — — — Night between 21 and 22.	In Sicily again	More shocks			Ditto.	
— — — — — and 24.	Comorn in Hungary	Very violent shocks....		All the houses built entirely or in part of wood, were thrown down, and the others more or less injured.	Journ. des Débats, 12 Nov.; Quo- tidienne, 16 Nov.; Phalange, 17 Nov.	
— — — — — 2 ^d 8 ^m P.M.	Cologne	A violent earthquake, equal to that of thirty years before (13 May, 1812?). Lasted two seconds.		Accompanied by subterranean noise. Houses were violently shaken, walls cracked, and chimneys thrown down. A hot and disagree- able wind had prevailed all the morning. On the same day magnetic perturbations were observed at Cracow, Nertschinsk, Toronto, and St. Helena; and on the next day at Cra- cow, Parma, Brussels, Milan, Naples, Prague, and St. Helena.	Journ. des Débats, Quotidienne, et Moniteur, 19 Nov.; Phalange, 26 Nov.; Colla, Notizie Meteorol.	
— — — — — Night between 27 and 28.	Constantinople	A violent shock			Moniteur, 26 Nov.	
— — — — — 28.	St. Jean-de-Maurienne in Savoy.	A shock		Great oscillations of the barometer were ob- served at St. Jean-de-Maurienne during the month. During the night of Oct. 24-25 a <i>doubtful</i> earthquake at Revermont in the de- partm. de l'Ain.	"Notes additionnelles" to M. Per- rey's Memoir on Earthquakes in the Basin of the Rhone, p. 21.	
— — — — — 29.	Sanguinetto in the pro- vince of Verona.	More shocks		There was also a storm of wind and rain on this day.	Colla.	
— — — — — 31.	Constantinople	Another shock		Accompanied by a storm	Moniteur, 26 Nov.	

1.	2.	3.	4.	5.	6.
1841 Oct.	Course in Perthshire.	Shocks on the 5th and 23rd.			Authorities for Oct. 1839.
—	Nov 1st Various places in the kingdom on Naples, and at Messina.	Renewed shocks.			Bull. de l'Acad. de Bruxelles, t. ix. pt. 1. p. 188.
—	Night between 18 and 19.	An earthquake in the south-west coast of France, from Bourdeaux to Hendaye in the department Basses-Pyrénées.		Occurred at the height of a terrible storm.	Ditto; Monteur, 30 Nov.; Quotidienne et Phalange, 1 Déc.; Colla.
—	20. Dido in the department Jura.	A severe shock.			M. Perrey's Memoir on Earthquakes in France, p. 88.
—	Several places in the kingdom of Naples, and at Messina.	Renewed shocks.			Bull. de l'Acad. de Bruxelles, loc. cit.
—	21. Dido.	A vibratory shock.			Ditto.
—	27. Smyrna.	Shocks were felt on Nov. 3, 5, 6, 7, 8, 18 and 26.		The shock of the 26th was pretty severe, and extended further than usual.	Gaz. Piém. 18 Déc.; Authorities for Oct. 1839.
—	Dec. 3 Various places in the departments of the Rhone, Ain, Isère, Jura, and Saône-et-Loire, in Savoy, and in Switzerland. Before 8 (7 ^h 53 ^m). In the neighbourhood of the earthquake was felt at Kunzilly, Annecy, Arbois, Grenoble, St. Foy-l'Argentière, Bullion near Arbrès, la Vavre, Beaupieu, Rosaillos, Nantua, Chablou, and Maçon.	At Lons-le-Saulnier rather severe shocks at the hours mentioned. At Geneva three shocks, from S.W. to N.E., in a space of 4 or 5 seconds. At Lyons a slight oscillatory shock, lasting some seconds. At Vienne (Isère) it was more severe; furniture was thrown down. At Chablou it was vibratory, and lasted 8 sec. At Bellay		Preceded by remarkably hot weather. At Geneva it had rained all day, and the air was charged with electricity. At Lyons a storm accompanied the earthquake. During the motion a compass needle suddenly turned from N. to N.N.W. At Chésey and Anac it blew a storm during the night. At Bellay a storm of very hot wind had blown for two days, but ceased during the night and day of the 2nd. At the fort of Pierre-Châtel most of the arms were thrown out of the racks. At St. Rambert-en-Bugey the subterranean noise resembled that of the fall of masses of rock, and frequently observed occurrence in that locality. At Seyssel a magnificent aurora had been observed the day before at 4 a.m. It	Monteur, 7, 8 et 11 Déc.; Journ. des Débats et Phalange, 7 et 8 Déc.; Quotidienne, 10 Déc.; Bull. de l'Acad. de Bruxelles, t. ix. pt. 1. pp. 14 et 191; Colla; Lamont's Annales, Heft 1. S. 163; Studer; Communication of M. A. Billiet to M. Perrey; "Notes additionnelles" to M. Perrey's Memoir on Earthquakes in the Basin of the Rhone, p. 21.

to 8 P.M. are given by other authorities for this place). At Chambéry, exactly 7 ^h 53 ^m . At Chessy and Anse, 8 P.M. At St. Rambert-en-Bugey, 7 ^h 47 ^m P.M.	the direction was N. to S. At St. Rambert-en-Bugey there were three distinct shocks, diminishing in intensity, which lasted together about 10 secs. Apparent direction = E. to W. At Seyssel there were two rather severe shocks, followed in five minutes by another less distinct.		shock was particularly felt in the upper parts of the Alps and in the districts of the hot springs. The springs of this kind at St. Gervais and Courmayeur were troubled the next day. Magnetic perturbations were observed on the following day at Monaco and Prague. Storms of wind and rain prevailed over France.
1841. Dec. 2 and 3. Rossano in Calabria	Slight shocks	.....	Colla.
9. In Savoy At Chambéry, 11 P.M. At Yon and Altemare - en - Bugey, 11 ^h 20 ^m . At Aix, Rumilly, Anancy, &c. 11 ^h 32 ^m .	A shock which lasted twenty-five seconds with violence, then changed to a slight tremor for thirty or thirty-five seconds (minutes according to Colla), and ended with another shock. Direction of the shocks = S.E. to N.W.	.....	Ditto; Quotidienne, 22 Déc.; Communication of M. A. Billiet to M. Perrey.
10. Belley in the departm. de l'Ain.	Another shock, not quite so severe as that of December 2, but in the same direction.	.....	"Notes additionnelles" to M. Perrey's Memoir on Earthquakes in the Basin of the Rhone, p. 23.
Burgschloss on the Neckar, in the grand-duchy of Baden.	A double shock, very severe.	.....	Lamont's Annalen, Heft 1. S. 163.
In the Moluccas	An earthquake	.....	M. Perrey's Memoir on Earthquakes in the Basin of the Rhine, p. 97.
14. In Savoy. Also felt at Lyons, 2	A moderate shock	.....	Communication of M. A. Billiet to M. Perrey; "Notes additionnelles"

1.	2.	3.	4.	5.	6.
A.M. In Savoy, 2 ^d 30 ^m .					
1841. Dec. 19. Several places in the Grand Duchy of Baden.		An earthquake		Magnetic perturbations observed on this day at Cracow, Munich, Brussels, Parma, Prague, and Milan. On the 18th and 19th a remarkable fall of the barometer at Parma. During the night of 19-20 an aurora borealis at Cracow.	to M. Perrey's Memoir on Earthquakes in the Basin of the Rhone, p. 23. Cotta, Giorn. Astron. 1842.
— 20. Kintail in Ross-shire, Scotland. 4 P.M.		A severe shock, of which there was no recurrence.		The noise, like the rushing of water or rattling of a carriage, was very distinct. Lightning (with occasional thunder) was extremely prevalent in the west and north highlands this winter.	Edinburgh New Philosophical Journal, vol. xxxvi. p. 84.
— 21. In the Moluccas ..		An earthquake			M. Perrey's Memoir on Earthquakes in the Basin of the Rhine, p. 98. Phalange, 1 Avril 1842.
— 25. Nikolajewskaja, and neighbouring places, on the eastern shore of the Black Sea.		An earthquake shock, of 3 secs. duration.		Accompanied by subterranean noise. Chimney were thrown down at Anapa.	
— 27. In Calabria ..		A strong shock of earthquake, lasting 15 secs.			Edinburgh New Philosophical Journal, vol. xxxvi. p. 372.
— 31. Pyrgos in the Peloponnesus. 10 A.M.		A violent shock, lasting 4½ secs. Several other shocks were felt before the following morning; they seemed to come in the direction of the island of Zante.			Moniteur, 7 Fév. 1842.
— Comrie in Perthshire ...		Shocks on the 3rd, 6th, and 7th.			Authorities for October 1839.
— Month Quebec in Canada		Several persons said they had very di-		This account seems very doubtful.	Moniteur et Phalange, 18 Juin 1841.
and day not					

1842. Jan. 4. 7 ^h 30 ^m P.M.	Sebsagur in Upper Assam.	enormous mass of rock fell from Cape Diamond.	The weather gloomy and cold	Quart. Journ. Geol. Soc. 1845, p. 143, quoting Journ. Asiat. Soc. of Bengal.
— 5. 3 ^h 15 ^m A.M.	Castellane in the department. Var.	Rather a severe shock, followed about ten minutes afterwards by another similar one.		Moniteur, 19 Janv.
— 10.	Kempten on the Iller, in Southern Bavaria.	A vibratory shock		Communication of M. Studer to M. Perrey.
— 14. 1 ^h 25 ^m A.M.	Biberach in Würtemberg.	A shock, from S.W. to N.E., lasting several seconds, and sufficiently strong to shake windows, furniture, and all the buildings violently.	Accompanied by a noise like thunder. The barometer, between 6 and 7 A.M., stood at 26 in. 2 l. (French l.), and the thermometer at -6° R. The motion was more strongly felt in elevated situations than in low ones.	Plieninger, Jahrsbericht über die Witterungs-Verhältnisse in Würtemberg.
— 15. 1 ^h 20 ^m A.M.	Ditto	Another shock, vertical, and less severe than the last. Followed soon after by two undulatory shocks.	The air calm, and sky clear. Barometer at 26 in. Ditto. 5.6 l. Thermometer at -6°.	
— 16. 1 P.M.	Ditto	Another shock.	This shock, like the first, was more strongly felt in the southern part of the town.	
— 17. Between 3 and 4 (P.M.?)	Ditto	Ditto	Ditto	Ditto.
— 18. 6 ^h 40 ^m P.M.	Ditto	Ditto. At first vertical, then undulatory from N.E. to S.W.	Preceded by a noise like thunder. Barometer on this day = 26 in. 8 l. Thermometer = 0° R.	Ditto.
— 19. 0 ^h 50 ^m A.M.	Ditto	Another shock, rather severe.	There was a fall of snow on this day	Ditto.
—	Patti in Sicily	Slight shocks, which recurred on the 20th and 22nd.		Colla.

1842. Feb. 16. O.S. 7 A.M.	Tifis in Georgia	An oscillation in a horizontal direction.	..... which?), a violent shock was felt at 5 A.M., accompa- nied by a rolling noise. On going upon deck the cap- tain saw the ship trembling as if she would go to pieces, although the sea was quite calm, and the weather fine. At 5 ^h 50 ^m a slighter shock was felt, at 9 ^h 45 ^m another still slighter, and near noon one more, scarcely percep- tible.	..... Accompanied by a noise like thunder .....	..... At Simla the smart shock disturbed all the mag- nets of the observatory violently, but the ac- tion on them was merely mechanical. The most destructive effects were produced in the valley of Jellalabad; the defences of Jellalabad itself, which had been repaired with extreme difficulty and toil by Sir Robert Sale's brigade, were almost destroyed, and the exertions of months were thus nullified.	..... Colla; Bull. de l'Acad. de Bruxelles, t. ix. pt. 2. p. 485. "Notes Additionnelles" to M. Per- rey's Memoir on Earthquakes in the Basin of the Rhone, p. 23.
— — — 17. At Falmouth, 8 A.M.	Helston, Camborne, Red- ruth, and the mining districts of Cornwall. Felt at Falmouth and the neighbourhood.	.....	.....	..... Memoir of M. Philadelphine on Earthquakes in the Caucasus, quoted by M. Perrey. Trans. Roy. Geol. Soc. of Cornwall, vol. v. p. 459; Communication of M. Plieninger to M. Perrey.	.....	.....
— — — 19. 11 ^h 20 ^m A.M.	Loodianah, Peshawur, &c. in the N.W. of India. Not felt in Scinde. Extended from Jellalabad to Shalkur in Thibet on the north, and to Saharunpore on the south.	Lasted one minute, forty-seven seconds at Peshawur; one minute, thirty se- conds at Loodianah, where the direction was N. to S.	.....	.....	..... Asiatic Journal, N. S. vol. xxxviii. pt. 2. p. 20; Report of the British Association for 1845, p. 4; Edin- burgh New Philos. Journ. vol. xxxiv. p. 107.	.....
— March 1.	Several places in the kingdom of Naples.	A shock .....	.....	.....	.....	.....
— — — 4.	Bex in the Canton du Vaud, Switzerland.	Shocks.....	.....	.....	.....	.....

1.	2.	3.	4.	5.	6.
842. Mar. 5. 9 P.M.	Delhi, Mussoorie, Simla, and other places in the N.W. of India.	Very quick and violent. cent.		The magnets of the observatory at Simla were all (mechanically) set in violent motion.	Asiatic Journal, N. S. vol. xxxviii. pt. 2, p. 17; Report of the British Association for 1845, p. 4.
6. About 5 ^h 40 ^m A.M.	Florence	An earthquake shock, consisting of a sudden blow, followed by oscillation from E. to W. Lasted 4 seconds, and was soon after followed by two slighter shocks.		No perceptible effect on the meteorological instruments.	Bull. de l'Acad. Roy. de Bruxelles, t. ix. pt. 2, p. 485.
8. Cracow 2 ^h 7 ^m P.M.		A slight tremor		The needle of the magnetometer remained perfectly stationary, and yet a suspended weight oscillated to a considerable extent. Clocks were not deranged.	Bull. de l'Acad. Roy. de Bruxelles, t. ix. pt. 1, p. 362, pt. 2, p. 146.
20.	Pesaro in the States of the Church.	A tremor			Quételet, Annuaire, 1844.
24.	Cotrone and other places in the Calabria.	A slight shock			Phalange, 4 et 6 Mai; Courier Français, 16 Mai.
Light between 24 & 25.	Different places in Greece	Local vibrations			Comptes Rendus de l'Acad. t. xv, p. 583.
30. 1 ^h 30 ^m A.M.	Bex and throughout the southern part of the Canton du Val de Saaz.	A severe shock, lasting four seconds at Bex. At Sion the duration was a little greater. At Hâle several persons felt the shock, which seemed to come from beneath upwards.		Accompanied by a loud heavy noise, described at Sion as a subterranean explosion.	Bull. de l'Acad. Roy. de Bruxelles, t. ix. pt. 1, p. 292, pt. 2, p. 147; Mérian; L'Institut, Nr. 434; Colla, Notice Meteorol. 1842, in Ann. Geograph.
...	Courie in Perthshire	A single shock, on the 10th.			Authorities for Oct. 1839.
April 1.	Cotrone and other places in the Calabria.	Three violent shocks.			Phalange, 4 et 6 Mai; Courier Français, 16 Mai.
2. At night.	Sargans in the canton of St. Gall, Switzerland.	Several shocks.		During a tempest	

1842. Apr. 4. 1 ^h 30 ^m P.M.	Blida on the north coast of Africa.	A severe shock .....	.....	L'Institut, Nr. 443; Journ. des Débats, 18 Avril; Siècle, 17 Avril; Phalange, 20 Avril. Authorities for the 18th.
— — — — — end 7.	6. Calamatta and several other places in Greece.	Commencement of shocks which were strongly felt on the 18th and 25th. A shock .....	.....	Bull. de l'Acad. Roy. de Bruxelles, t. ix. pt. 1. p. 513. Ditto.
— — — — — 3 ^h 35 ^m P.M.	7. Borgotaro in Tuscany.	A shock .....	.....	L'Institut, Nr. 443; Journ. des Débats, 18 Avril; Siècle, 17 Avril; Phalange, 20 Avril.
— — — — — 6 ^h 40 ^m A.M.	9. Ditto	Ditto .....	.....	Phalange, 4 et 6 Mai; Courier Français, 16 Mai.
— — — — — Night between 9 and 10.	Algiers	A rather violent shock, followed by two others. More shocks	Accompanied by subterranean noise	Comptes Rendus, t. xv. pp. 568 et 725; Bull. de l'Acad. de Bruxelles, t. ix. pt. 2. p. 147; National et Courier Français, 17 Mai; Moniteur et Phalange, 18 Mai.
— — — — — 11 and 12.	11. Cotrona in Calabria ...	More shocks .....	.....	Ditto.
— — — — — 18. 9 ^h 40 ^m A.M.	Patras and Athens in Greece.	At Patras a shock which lasted two minutes and a half. At Athens it was less violent, and lasted but 2 $\frac{1}{4}$ mins. At Patras a shock of less violence than that of the morning; lasted two minutes and three quarters. At Sparta the shocks lasted but 25 or 30 secs. A slight tremor	At Patras little damage was done, but at Calamatta and Androussa houses and churches were injured. In the province of Maina some of the inhabitants were crushed beneath the ruins.	Comptes Rendus, t. xv. p. 568. Authorities for the 18th.
— — — — — 6 ^h 17 ^m P.M.	Ditto, and at other places in Greece. These shocks were felt in the chain of Mount Taygetus.	.....	.....	Colla, Catalogue of Earthquakes in 1842, extracted from Ann. Geolog.; Mérian.
— — — — — 20. — — — — — 25. 3 ^h 55 ^m A.M.	20. Pesaro in the States of the Church. Patras in Greece	A violent shock, lasting a minute and a half. Two severe shocks, the first of which was the stronger. Apparent direction = S. to N.	The first shock was accompanied by subterranean noise like distant thunder. The barometer was observed to fall suddenly and immediately to return to its former level; hence the effect was probably mechanical, arising from the blow itself.	
— — — — — 28. 7 ^h 15 ^m A.M.	28. St. Aubin, Sauge, and Vaumarcus, in the canton of Neufchâtel.	.....	.....

1.	2.	3.	4.	5.	6.
1842. Apr. 28 Between 1 and 2 P.M.	Grenoble	Rather strong oscillation.	derable heightrilled in quick succession upon the shore.	On the 29th magnetic perturbations at Parma.....	M. Perrey's Catalogue of Earthquakes in the Basin of the Rhine, p. 98. Authorities for Oct. 1839.
— May 7. 5 P.M.	Comrie in Perthshire .. Island of St. Domingo, especially at Cape Haytien. Extended to Jamaica, Porto Rico, and almost all the West Indian isles.	Shocks were felt on the 21st and 22nd. Two principal shocks. The second lasted about 3 minutes, the first not so long. Another account says the shocks lasted 85 seconds. Succeeded by many slighter shocks on the 8th, 9th, and perhaps 10th. A violent shock	Felt on board ships in the road.	Many houses were thrown down or injured.	Annual Register, 1842, p. 109; several French journals of June 17 and following days.
— 21. June 3. 8 P.M.	St. Barthelemy in the island of St. Domingo. Darstetten in the Sim- menthal, canton of Berne.	A slight shock.....	.....	.....	National, 28 et 30 Juin; Phalange, 1 Juillet. Mérian; Studer.
— 4. 1 ^h 30 ^m A.M.	Ditto	Another and more se- vere shock.	.....	Accompanied by noise. On the 3rd an igneous meteor was observed at Parma and in the south of France. On the 4th, magnetic per- turbations at Brussels, and on the 4th and 5th at Munich and Prague.	Ditto.
— 15.	Eggeneth or Egeest in the Sondmør, Norway.	A shock of earthquake	.....	.....	Bull. de l'Acad. de Bruxelles, t. ix. pt. 2. p. 485.
— 21. — 24. 5 ^h 30 ^m A.M.	Ditto	Ditto .....	.....	.....	Ditto.
— 28.	Island of St. Domingo...	Very severe shocks ..	.....	.....	Quotidienne, 11 Août et 2 Sept.; Cotta. Notizie Meteorol. p. 17.
— 29.	Islands of Grenada, An- tigua, and St. Kitt's.	.....	.....	.....	Ditto.
— — —	Leipzig	Shocks .....	.....	.....	Pheninger, Jahrbuch über die Witterungs-Verhältnisse in Wör-

— In the first half of the year.	In the Ponce (in the island of Porto-Rico?), 1500 miles east of Saint-Martinville, Louisiana.	2nd, and 8th.	.....	on the 8th to the extent of rather more than half an inch.	Moniteur, 26 Juin.
— July 3. 4 ^h 45 ^m A.M.	St. Jean-de-Maurienne in Savoy.	A shock of four minutes' duration.	.....	Why the position of this place should be fixed with reference to another 1500 miles distant does not appear, unless the shock were felt at Saint Martinville.	"Notes additionnelles" to M. Perrey's Memoir on Earthquakes in the Basin of the Rhone, p. 24.
— 5 A.M.	Campoli in the kingdom of Naples.	Three slight shocks.	.....		Bull. de l'Acad. Roy. de Bruxelles, t. ix. pt. 2. p. 485.
— 10. Between 11 A.M. and noon.	Dunblane in Scotland.	A slight undulatory shock.	.....	Perhaps this earthquake belongs only to the series of Comrie shocks.	Bull. de l'Acad. Roy. de Bruxelles, t. ix. pt. 2. p. 485.
— 12. 4 ^h 20 ^m P.M.	Calamatta and Sparta, in Greece.	A shock from S.W. to S.E. (?)	.....		Communication of M. Plieninger to M. Perrey.
— 13.	In Norway	A slight tremor	.....	Preceded by a loud aerial noise.	Courier Français, 26 Août.
— 31. About 7 ^h 30 ^m P.M.	Gross-Kanischka in Hungary.	An earthquake	.....	On the 30th shooting stars were observed at Naples, and a remarkable storm occurred at Lyons.	Quételet, Ann. de l'Observ. de Bruxelles, 1844, p. 309.
— ...	Comrie in Perthshire	Shocks were felt on the 1st and 10th.	.....		Bull. de l'Acad. Roy. de Bruxelles, t. ix. pt. 2. p. 485.
— Aug. 3. 2 ^h 8 ^m A.M.	Island of Martinique	A shock lasting about two seconds. They were often felt about this time, especially at night.	.....		Authorities for Oct. 1839.
— 8.	Island of Guadaloupe, at Pointe-à-Pitre.	Very distinct shocks.	.....		National, 19 Sept.; Echo de la Haute Marne, 22 Sept.; Colla, Notizie Meteorol. p. 18.
— 19. About 8 P.M.	Pitlochry, between Dunkeld and Blair, Scotland.	Three shocks	.....	The night was warm and sultry with a drizzling rain. At midnight the thermometer stood at the unusual height of 72°.	Colla, <i>loc. cit.</i> ; Institut, Nr. 458.
— 22. According to Prof. Kreil, between 6 and 7 P.M.;	In North Wales. Extended through the whole of Anglesea, especially the southern portion. Said	A shock	.....		Report of the British Association for 1843, p. 121.
			.....		Ditto; Prof. Kreil in Bull. de l'Acad. Roy. de Bruxelles. t. ix. pt. 2. p. 485.

1.	2.	3.	4.	5.	6.	
and at Prague, at 8 ^h 15 ^m P. M.	by Prof. Krel to have been perceived at Prague by its effect on the self-register- ing barometer and thermometer, which, he observes, are sen- sible to the smallest shock.	A very distinct undu- latory shock.				
1842, Aug. 26. Catanzaro in Calabria .. In the even- ing.				Colla.		
— — — — — Course in Perthshire ..	A single shock on the 27th.	A slight shock.		Authorities for Oct. 1839.		
— Sept. 6. Island of Jamaica	Four shocks at inter- vals of fifteen or twenty minutes.			Colla, Notizie Meteorol. p. 18.		
— — — — — 9 Gross-Kauscha in the county of Szalad, Hungary. Felt within a circle of six or eight leagues in radius.				Several houses were injured and all the glass Phalange, 5 Oct.		
— — — — — 12 Patras and Athens, .. Greece.	A severe shock ...			Quotidienne, 3 Oct.		
— — — — — Course in Perthshire ...	Shocks on the 2nd, 24th, and 25th.			The first shock on the 24th moved the instru- ments to the extent of about an eighth of an inch horizontally and a sixteenth of an inch vertically.	Authorities for Oct. 1839.	
— Oct. 2 Gurgenti in Sicily	A shock			Colla.		
— — — — — Dinan in the departm. ..	A shock of 2 sec. du- ration. The appa- rent direction of the oscillation was E. to W.			Accompanied by a hollow sound, which some persons took for a clap of thunder; but the sky was perfectly free from clouds, and the noise came distinctly from beneath upwards.	Colla, Ann. 2, p. 409.	
Night between 6 & 7.					Asiatic Journal, N. S. vol. xxix. pt. 2, p. 409.	
— — — — — 9 Baroda, north of Bom- bay, Hindostan ..					Accompanied at Coblenz by a loud noise. At Neuwied "the devil's house and devil's kit- chen" experienced shocks. The air was calm, the temperature mild, and the sky covered with clouds. On the 15th an intense meteor	Colla, Ann. Geolog.
— — — — — 13. Coblenz and Neuwied, At in the even- ing.	At Coblenz, two shocks. At Neu- wied the motion lasted six seconds.					

1842. Oct. 24. 8 ^h 5 ^m A.M. or 8 ^h 11 ^m P.M.	At Algiers	A rather severe shock, from W. to E., last- ing some seconds.	.....	was seen in the departm. Isère, on the 12th and 13th great variations in the state of the barometer were observed at Parma, on the 13th magnetic perturbations at Parma, and on the 13th and 14th at Prague, and 14th at Naples and Brussels.
— — — — — 25. 0 ^h 15 ^m P.M.	Tivoli, in the States of the Church.	A slight shock, appa- rently undulatory, from E. to W.	.....	Accompanied by a rolling noise like that of thunder among the mountains. Caused much alarm, especially among the Spaniards.
— — — — — 29. 8 P.M.	Sebsagur in Upper As- sam.	Tremulous motion, apparently from S.W. to N.E.	.....	Phalange, 15 Nov.
— — — — — Nov. 1. About 7 ^h 15 ^m P.M.	At Algiers	A strong oscillation, followed almost im- mediately by an- other of greater vio- lence.	.....	Quart. Journ. Geol. Soc. 1845, p. 143, quoting Journ. Asiat. Soc. of Ben- gal.
— — — — — 8. Between 8 and 9 A.M.	Montreal, La Chine, Trois-Rivières, and other places in Canada.	Terrible shocks .....	.....	Gaz. de Milan, 20 Nov.; Communi- cation of M. Colla to M. Perrey.
— — — — — 9. 10 ^h 15 ^m A.M.	Belpasso and all the southern side of Etna.	A very distinct shock.	.....	Moniteur, 5 Déc.; Report of the British Association for 1845 (Trans. of the Sect.), p. 20.
— — — — — 13.	Nantes, France	A shock .....	.....	Gaz. de France, Moniteur, National, et Courier Français, 17 et 18 Déc.; Phalange, 6 Janv.; Majocchi, Annali di Fisica, t. vii. p. 274; Colla.
— — — — — 21.	Several localities in the canton of Neuchâtel. Vaumarens and St. Aubin are mentioned.	Slight shocks .....	.....	Moniteur, 17 Nov.; Bull. de l'Acad. Roy. de Bruxelles, t. x. Nr. 2. p. 16. Mérian; Studer.
— — — — — 25.	Several places in the Abruzzo Ulteriore, kingdom of Naples. And, the same day, some shocks at Ca- tania.	Three severe shocks, the two first being sudden jerks or blows, and the third undulatory. Total duration = 9 secs.	.....	Some days before, a globe of fire had been seen in the Abruzzo, moving from E. to W.

Authorities for the 9th.

1.	2	3.	4.	5.	6.
1842. Nov. 27	Nicosia and other places near.	Shocks .....	.....	Followed by an eruption of Etna	Authorities for the 9th.
— 29	In the Commune of Pasla, Calabria Citeriore.	A severe shock .....	.....	.....	Ditto.
About 2 A.M.	.....	Shocks felt on the 18th and 29th. A severe shock, consisting of repeated undulations to and fro.	.....	.....	Authorities for Oct. 1839.
— Dec. 4	At Algiers .....	.....	.....	Some houses were injured. Many persons were made ill by the undulatory motion.	Gazette de France, et Courrier Français, 16 Déc.
About 3 A.M.	.....	.....	.....	.....	.....
— 5.	Aquila in the kingdom of Naples	A severe undulatory shock.	.....	.....	Moniteur et National, 7 Janv. 1843.
6 A.M.	.....	.....	.....	.....	.....
— 9.	On the side of Etna, at Nicolosi, &c.	A slight shock .....	.....	In the midst of loud explosions, during an eruption of the volcano.	Majocchi, Annali di Finica, t. vii. p. 276.
2 P.M.	.....	.....	.....	No damage done	Gazette de France, et Courrier Français, 18 Janv. 1843.
5 ^h 45 ^m P.M.	Potenza in the Basilicata, kingdom of Naples.	A vibratory shock .....	.....	.....	.....
— 27.	In Dalmatia	Very many shocks felt between this date and Feb. 11, 1843.	.....	.....	Bull. de l'Acad. Roy. de Bruxelles, t. x. pt. 2, p. 15.
— ...	Commune in Perthshire...	Shocks on the 4th and 17th.	.....	The shocks on the 17th were felt only at Zom-perrao, half a mile east of Comrie.	Authorities for Oct. 1839.
—	Zetela, near the mountains of Puebla, Mexico.	An earthquake .....	.....	Accompanied by an eruption of flame, &c. from To-Rano.	Moniteur, 20 Déc., under news from Mexico of 20 Nov.

The foregoing Catalogue raisonnée, thus completed to the end of the year 1842, was originally proposed to have been extended in the same form, to the end of the year 1850. The discussed annual Catalogues published by Professor Perrey, of Dijon, which commence with the year 1843, were found so complete, after the collation of a considerable term of their epoch with other documents, that it appeared a waste of labour to continue the British Association Catalogue, in its tabular form, through the remaining eight years. This Catalogue therefore here closes, but the discussion for the elements of space and time, now to follow, will embrace its whole period and up to the end of 1850; and will be derived as respects the concluding years from the Catalogues of the same period, and of which will be stated

FOURTH REPORT

UPON

THE FACTS AND THEORY

OF

EARTHQUAKE PHENOMENA.

THE present, Fourth, and probably last Report on Earthquakes that I shall have the honour of presenting to the British Association, has for its objects the discussion of the great catalogue of earthquakes printed in several preceding volumes of its 'Transactions,' the last portion of which only appeared in type in 1855, and the completion, as far as possible, of the complement of the other desiderata mentioned at the conclusion of the First Report (1850). The pressure of other occupations, with some uncontrollable circumstances, have delayed for nearly three years its appearance: the delay, however, has not been without advantage; it has enabled me more fully to grasp additional conditions and difficulties, before unnoticed, of some branches of the subject, and to derive advantage from the contemporaneous labours of the few physicists who are engaged in Seismology; foremost amongst whom stands M. Perrey of Dijon.

The reader will with advantage refer to the conclusions of the Second Report (1851), as to the construction of the catalogue which constitutes the Third (1854), before perusing the present; as well as to the concluding note of that Report, in which it is stated that the catalogue commencing at 1606 B.C., and originally proposed to be extended in its tabular form to the end of 1850 A.D., was concluded at the end of the year 1842, from which period up to 1850, and indeed later still, the catalogues of Prof. Perrey supply all that is needful, though it is to be regretted that they are not tabulated for more convenient reference. But although the British Association *Catalogue* concludes with 1842, the *discussion of facts* has been extended to the end of 1850, the base of induction for the last eight years being supported by the labours of Perrey.

The whole base of induction therefore for such conclusions as are here to be attempted,—embracing between 6000 and 7000 separate recorded earthquakes over every known part of the globe, both on land and ocean,—the character of the facts given,—their scantiness as to information of scientific value,—the methods, or rather the want of all method, in their observation, and other causes, mentioned in the Second Report,—I think justify me in stating my conviction, that nearly all that can be drawn from the collection and discussion of such records has now been done, and that the labour of collecting and calculating further and future *Seismologues* will be in a great degree thrown away, unless the cultivators of science of all countries,—in conjunction with the scientific bodies and the scientific departments of the chief civilized governments of the world,—shall unite in agreeing to some one uniform system of seismic observation, and record and transmit the results

periodically to a central *bureau* for discussion. What has been done for astronomy and for terrestrial magnetism, is beginning to be done for meteorology, and through the suggestive labours of Maury, Bache, and others, for maritime discovery, ought to be done now for seismology, whose chief requirements could be readily added to those already supposed to be systematized from Lieut. Maury's proposals, as well as to those long in course in the astronomical, magnetic, and meteorological observatories of the world. The spread of the net of telegraphic wires rapidly over the whole earth offers facilities for the observation of earthquake phenomena, in which time always enters as so important an element, never before possessed. We shall revert to this in treating of seismometry.

Before proceeding to the discussion of the British Association Catalogue, I propose giving some account, in a connected form, of the discussions by Professor Perrey, of his own local or partial catalogues, and of the conclusions he has thence drawn; as well as referring to some minor catalogues, more or less completely discussed by their authors: amongst the latter, Mr. Milne's valuable contributions escaped my notice when preparing my first report. Perrey's labours in generalizing (as far, perhaps, as can from the data be safely done) the facts of several great seismic kingdoms, and announcing their results, form a valuable prelude to the still larger base of generalization finally here discussed, and extending to the whole known globe. The *discussed* catalogue memoirs of Perrey, to which I have had access, apply to the following localities:—

In the European Hemisphere—

The Scandinavian Peninsula and Iceland.
 The British Islands.
 The Spanish Peninsula.
 France, Belgium, and Holland.
 The Basin of the Rhone.
 The Basin of the Rhine.
 The Basin of the Danube.
 The Italian Peninsula.
 Algeria and Northern Africa.
 The Turco-Hellenic Peninsula, with Syria.

And in the American Hemisphere—

The Basin of the Atlantic.
 Canada and the United States.
 Mexico and Central America.
 The Antilles.
 Chili and La Plata.
 Cuba, by M. Poey.

In addition to which, Perrey has combined and discussed together—

Europe, with the adjacent regions of Africa and of Asia.
 The North of Europe and of Asia—

viewing the three continents in the light of two parallel Austral and Boreal zones.

The general method adopted by Perrey has been, after an introductory physico-geographical sketch of the region, and the catalogue itself of earthquakes, to discuss them numerically and graphically.

In time { Numerically and
 { relatively { By centuries { Seasons, months,
 { By years .. { days.

Occasionally also with reference to lunations.

In space { With reference to direction,
i. e. horizontal direction, of
shock. } With reference to sup-
posed derivative or
mean horizontal direc-
tion of shock.

And lastly, as to relative intensity, or dynamic value of the shock in each direction, which he arrives at on the assumption that this, in any given rhumb, is proportional to the number of shocks observed in its direction in a given period, a supposition which—although perhaps not without some value, as admitting of one mode of regarding the relations of distant seismic regions not otherwise possible—admits of the gravest doubt whether it have any real natural basis.

We shall consider the results in the order above. Near as Norway and Sweden are topographically to the British Islands, it is not with these, but with Iceland and the intervening band of the Northern Ocean that the Scandinavian peninsula is in connexion as a seismic region; very few examples occur of simultaneous action between the former; but seldom has there been any marked convulsion in Iceland without commotion in Norway, &c., and *vice versa*. Scandinavia itself, one of the most remarkable masses of land in slow process of elevation in the world, also shows its connexion with internal action; and were it not that Iceland is pierced with numberless vents, broken and shattered in every direction by volcanic action, that admits of no cessation or consolidation above, there can be no doubt that the destructive power of earthquakes would be manifested in the northern peninsula to a far more serious extent and intensity.

That Greenland, at least the east coast, and the Farøe Islands are shaken frequently, is highly probable, though I am not aware of any such record.

The following is the result of Perrey's chronology of this region:—

TABLE I.—Earthquakes of Scandinavian Peninsula and Iceland.

Century A.D.	With dates of month or day.												Of Season.	Of Year	Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Winter.	Summer.	
XII. to XVII.	3	2	1	1	■	..	...	...	...	...	...	...	...	...	19
XVIII.	13	7	9	5	7	4	9	5	8	7	8	11	2	3	13
XIX.	17	11	11	7	7	6	8	8	10	10	11	6	...	1	...
Totals	33	20	21	13	16	10	17	13	18	17	19	17	2	4	32
	Winter 74			Spring 39			Summer 48			Autumn 53					

On examining this Table, Perrey remarks the same preponderance of earthquakes in the winter half of the year, that is evident from many of his other calculations for various regions. Here, for the six months of winter, there are 129 shocks, and but 91 for the summer half year.

Perrey is also of opinion, from the general result of his researches, that there is a preponderance of shocks at the equinoxes and summer solstices, which he denominates the "Critical Epochs" of the year. It is so for Scandinavia.

The total number of earthquakes given with dates is 252, representing by twelve the mean annual number. He tabulates the proportional number for each month thus:—

TABLE II.—Scandinavia. Relative frequency throughout the year.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Proportional number.
1.85	1.12	1.18	0.75	0.90	0.56	0.93	0.75	1.01	0.95	1.06	0.95	= 12

Winter	1.38
Spring	0.73
Summer	0.90
Autumn	0.99

And at the two months of each solstice and equinox—

March and April	0.94
June and July	0.74
September and October	0.95
December and January	1.36

As to general direction of the *observed or horizontal element* of shock—it has in most instances traversed a line, with more or less divergence, stretching away from Iceland; and there can be little doubt that this is the real line of propagation of the original pulses.

Perrey, however, conceives that a mean or chief resultant direction of shock for each given seismic region may be calculated in the following way. Taking the mean frequency of shock = 1, he finds for the eight principal rhumbs proportional numbers, as for example in the present case:—

TABLE III.

Rhumb, or direction of shock.	Relative frequency in direction.
N. to S.	0.73
N.E. „ S.W.	1.09
E. „ W.	0.73
S.E. „ N.W.	1.09
S. „ N.	1.09
S.W. „ N.E.	1.45
W. „ E.	1.09
N.W. „ S.E.	0.73

Then, considering the cause of movement in any given direction to be proportional in intensity to the number of times that it has acted in each observed direction, viz. as proportional to the preceding numbers, he treats these as the forces themselves given in magnitude and in direction, and compounds them for a single resultant according to Lambert's formula.

This process gives for Scandinavia a general resultant direction of propagation of S. 22° 30' W., and with an intensity or force represented by 0.94.

If we study this presumed direction with the Mercator chart before us, we find that the line is not very wide of that forming the general length of

the great Scandinavian chain, and is in fact nearly a normal to the actually observed directions of shock.

It is a fact observed in many other seismic mountain chains, as well as along the lines of great valleys and river-courses, that the main directions of propagation of shock are along the lengths of the chains, valleys or river-courses; and a very obvious explanation why this should *frequently* be the case suggests itself, namely, that the solid materials of the earth are less shattered and discontinuous, and more homogeneous in these directions than in those transverse to the ranges and valleys, &c.; but how far this is in any way connected in nature with Perrey's conclusion admits still of doubt; and indeed it is manifest that any attempt to calculate a general or mean resultant, from the horizontal component of shock *only*, must be at least incomplete, and, from other reasons that will be given when treating of seismometric instruments, may be said to be at present impossible. I should by no means wish, however, altogether to reject this ingenious method of discussion in the present state of our knowledge.

Perrey's results are subjoined for—

TABLE IV.—Earthquakes of the British Islands and Northern Isles.

Century.	Earthquakes with date of month.												Total.	
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		With date of Year only.
XI. ...	...	...	2	2	1	...	...	1	...	...	1	...	1	8
XII. ...	1	...	...	1	...	...	...	1	2	...	...	2	4	11
XIII. ...	2	1	...	...	1	1	...	...	1	...	...	2	6	15
XIV. ...	...	...	...	...	1	...	1	...	...	...	1	...	1	4
XV. ...	...	...	...	...	...	...	...	...	1	...	...	...	...	1
XVI. ...	...	2	...	1	2	...	...	1	...	...	...	1	...	8
XVII. ...	2	...	...	...	...	1	...	...	2	3	1	2	2	14
XVIII. ...	5	4	7	5	3	2	3	5	6	6	6	3	1	63
XIX. ...	9	9	10	7	6	6	5	11	12	8	11	11	2	110
Totals.	21	16	19	10	16	10	9	19	24	17	22	28	17	234
	Winter 56			Spring 42			Summer 52			Autumn 67				

The number occurring in spring and summer together is but three-fourths that of autumn and winter united, the relative number for the four seasons being—

Winter	1.03
Spring	0.76
Summer	0.96
Autumn	1.24

And the two months of the critical epochs—

Winter solstice	1.28
Spring equinox	0.96
Summer solstice	0.53
Autumnal equinox	1.13

The relative numbers as to horizontal direction :—

S.	to N.	.....	0·48
N.E.	„ S.W.	.....	0·48
E.	„ W.	.....	1·70
S.E.	„ N.W.	.....	0·73
S.	„ N.	.....	0·73
S.W.	„ N.E.	.....	1·46
W.	„ E.	.....	1·46
N.W.	„ S.E.	.....	0·97

from which, by the preceding method, Perrey computes a mean horizontal direction of

S. $39^{\circ} 5'$ W. to N. $39^{\circ} 5'$ E.,

which is about the line of direction of Loch Ness and of the Caledonian Canal.

This is certainly, however, not the general or mean horizontal direction of British earthquakes, which appears to be one from south to north, veering more or less to the east or west, but having on the whole a direction passing through the probable focus of the Lisbon earthquakes and of the Canary Islands. I am not aware that any attempt has been made to ascertain the angle of emergence of the wave of shock for any British station, except indirectly by myself, in my "Memoir on the British Earthquake of November 1852" (Trans. Roy. Irish Acad. vol. xxii. part 1) at Dublin, which was from 25° to 30° inclined to the horizon; and assuming the origin to have been even somewhere *between* Great Britain and Lisbon, the depth of focus must have been very great; that earthquake extended over the greater portion of the British Islands, the maximum disturbance on the surface being about Shropshire.

Mr. David Milne, in one of a series of very able papers on British earthquakes in the 'Edinburgh Philosophical Journal,' vols. xxxi.—xxxvi., which I regret not having noticed in my Second Report as prominently as they deserve, expresses his conviction (as it appears to me, however, from very insufficient grounds) that all British earthquakes have had an origin of disturbance immediately beneath Great Britain, and not at some distant point beyond, his chief reasons being, 1, that with few exceptions they affected only certain portions of the island; 2, that there was in all the districts affected some spot where the concussion and attendant noise were greater than anywhere else, and that they diminished with their distance from this spot; 3, that the shock and the noise moved simultaneously from this spot.

A reference to the Catalogue will show that these are by no means the general prevailing facts; and if they had been so, they do not prove the point, for reasons to be gathered from the Second Report. In the absence of any knowledge of the angle of emergence, it is a very incomplete statement of fact when Milne says, that "out of 110 shocks recorded in England, 31 originated in Wales, 31 along the south coast of England, 14 on the borders of Yorkshire and Derbyshire, and 5 or 6 in Cumberland." "These facts," he adds, "seem to show that the seat of action cannot be very far down in the earth's interior." Locally variable surface-disturbance, and even none at certain localities, within large areas exposed to seismic action, are amongst the most common phenomena of observed earthquakes even of the greatest extent and intensity, and arise, amongst other reasons, from the heterogeneous and dis-located materials of the earth's crust perturbing the

elastic wave. A considerable number of shocks, recorded in Scotland, have been stated to have had a horizontal direction more or less from west to east; and this is by no means incompatible with the general prevalent direction from south to north already mentioned; nor has it been unnoticed elsewhere, that long ranges of hills of hard elastic rocks, with deep intervening valleys, change the general horizontal course of the wave of shock reaching their flanks into one mainly felt along the line of the chain. The little shocks for long periods almost continuously felt in and about Comrie in Scotland, have all had a general direction from west to east; but these, like the similar phenomena long carefully observed by Prof. Merian at Basle in Switzerland, those at East Haddam in Massachusetts and elsewhere, I omit from consideration here, as very doubtfully belonging to the class of earthquakes proper at all, and perhaps no more than tremors, more or less forcible at the surface, due to the fracturing of rocky masses below, by the gradual processes of elevation or depression of the land. Excluding these, our records, so far as they go, point to the south-to-north general direction as given.

Milne has discussed, with reference to period of the year, the circumstances of 139 Scottish and 116 English earthquakes; and the result squares pretty closely with Perrey's.

The following is Milne's Table:—

TABLE V.			
	Scotland.	England.	Total.
January.....	14	11	74. Winter months.
February	14	13	
March	12	10	
April.....	9	10	44. Spring months.
May	8	4	
June	4	9	
July	5	5	58. Summer months.
August	12	9	
September	12	15	
October	14	11	79. Autumn months.
November.....	20	12	
December.....	15	7	
	139	116	

He notices also the fact, which we shall find has not escaped Perrey ('Mém. on France'), that the period of the year at which seismic action appears to be greatest, is that when both the actual height of the barometric column is the minimum, and the range of its oscillations the greatest in the year; and he has put with clearness the enormous total effect in the increase or diminution of pressure over large areas, due to such changes in atmospheric pressure, as a possible (he deems a certainly) connected cause in the production of earthquakes.

Proceeding now to the Spanish Peninsula, comprehending all west of the Pyrenees and the ocean washing the shores of Portugal, the following are Perrey's results:—

TABLE VI.—Earthquakes of the Spanish Peninsula.

Century.	Earthquakes with date of day or month.												With date of Year only.	Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
XI. ....	...	...	...	...	...	...	...	...	...	...	...	...	3	3
XII.	1	1	...	1	...	...	...	...	...	...	...	...	1	4
XIII. ....	...	...	...	...	...	...	...	...	...	...	1	...	1	3
XIV.	1	...	3	...	1	...	...	...	...	...	...	...	2	8
XV. ....	...	...	...	1	...	...	...	...	...	...	...	...	2	4
XVI.	2	...	...	1	...	...	3	...	...	1	...	...	3	10
XVII. ....	...	...	...	...	...	2	...	2	1	2	1	1	1	10
XVIII.	11	8	7	8	4	6	5	9	2	9	13	8	3	85
XIX.	10	5	6	7	4	5	10	5	9	11	7	5	...	85
Total.	25	14	16	18	9	14	18	16	12	23	22	14	■	220
	Winter 55			Spring 41			Summer 46			Autumn 59				

Taking the mean monthly frequency = 1, the relative monthly frequency, and that according to season, are as follows:—

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1·49	0·84	0·95	1·07	0·54	0·84	1·07	0·95	0·71	1·37	1·31	0·84
Winter 1·09			Spring 0·82			Summer 0·91			Autumn 1·17		

or in autumn and winter together, 114 earthquakes against 87 in the spring and summer.

As respects observed horizontal directions, the ratios were—

N.	to S.	0·38
N.E.	„ S.W.	0·76
E.	„ W.	2·67
S.E.	„ N.W.	0·76
S.	„ N.	1·91
S.W.	„ N.E.	0·38
W.	„ E.	0·76
N.W.	„ S.E.	0·38

which, by the method of calculation already given as adopted by Perrey, gives for the mean horizontal direction—

E. 31° 56' S. to W. 31° 56' N.

This deduction appears to agree tolerably well with the actually recorded directions of shocks in Portugal and Spain, whose focus seems to be beneath the sea, between Lisbon and the Azores, all of which, as well perhaps as the Canaries, are connected as one seismic region. Perrey states, that in the Pyrenean chain, taken *separately*, not only is the preponderance of seismic

action in the winter reversed, so that shocks are more frequent in summer than in winter, and those in summer and spring together are to those in autumn and winter as 2 to 3, but the observed horizontal direction is different, being most usual in the main line of the chain.

If this be so, it would either be explicable as a case of deflected wave, like that already mentioned with regard to the general north and south line in Great Britain, becoming a south-west and north-east one in Scotland, the angle of deflection in the present instance being small ; or it would indicate that some of the shocks of the Pyrenees have connexion with the Mediterranean seismic region.

Spain, including Portugal, in its external configuration, with its vast table-land of the two Castiles, rising nearly 2000 feet above the sea, is perhaps the most interesting portion of Europe, not only in this respect, but as a region of earthquake disturbance, where the energy and destroying power of this agency have been more than once displayed upon the most tremendous scale.

It may be worth while to place here the tables of the progression of the shocks of the two great Lisbon earthquakes of 1755 and 1761, as collected by Milne (Edinburgh Phil. Journ. vol. xxxi.) from various sources, although the chief result has been already discussed in the Second Report. The time given in the Tables is reduced to Lisbon time ; the distances in degrees of seventy miles English each.

Progressive rate of the shock, Lisbon earthquake of 1st November, 1755.

Localities.	Moment observed of shock.	Distance from presumed origin.	Time from impulse to arrival.	Observations.
Presumed focus, lat. 30°, long. 11° W.	h m 9 23	° ' ...	m s ...	At sea.
A ship at sea, in lat. 38°, long. 10° 47' W.....	9 24	0 30	1 0	
Colares	9 30	1 30	7 0	Portugal.
Lisbon	9 32	1 30	9 0	
Oporto.....	9 38	2 30	15 0	
Ayamonte	9 50	4 0	27 0	Spain.
Cadiz	9 48	5 0	25 0	
Tangier and Tetuan	9 46	5 30	23 0	
Madrid.....	9 43	6 0	20 0	
Gibraltar	9 55	6 0	32 0	
Funchal	10 1	8 30	38 0	Madeira.
Portsmouth.....	10 3	12 30	40 0	
Havre	10 23	13 0	60 0	
Reading	10 27	13 30	64 0	
Yarmouth	10 42	15 0	79 0	[certain.]
Eyam Edge.....	10 30	15 30	67 0	Derbyshire (not
Durham	9 58	17 0	35 0	Uncertain.
Amsterdam	10 6	17 0	43 0	
Loch Ness	10 42	18 0	79 0	
Hamburgh	11 43	20 0	140 0	Uncertain.

Much uncertainty attends many of the statements as to time ; and at several localities there is evidence that the shocks arrived much more rapidly than at others, in relation to distance. Thus at Cork two shocks were felt at 9^h 33^m.

The longitudes are from the meridian of Greenwich.

Progressive rate of the shock, Lisbon earthquake of 31st March, 1761.

Locality.	Moment observed of shock.	Distance from presumed origin.	Time from impulse to arrival.	Observations.
Presumed focus, lat. 43°, long. 11° W.	h m 11 51	° ' ...	m s ...	At sea.
Ship at sea, in lat. 43°, not many leagues from coast of Portugal	11 52	6 30	1 0	
Ship in lat. 44°, and about 80 leagues off coast	11 54	1 45	3 0	
Corunna	11 51	2 30	6 0	
Ship lat. 44° 8', and 80 leagues W.N.W. of Cape Finisterre	11 58	3 30	7 0	
Lisbon	noon	4 30	9 0	Uncertain.
Madeira	12 6	10 0	15 0	
Cork	12 11	9 30	20 0	
Loch Ness, between	{ 11 40 and 12 40 }	11 0	{ 20 0 and 49 0 }	
	{ 1 15 and 1 45 }		{ 84 0 and 114 0 }	
Amsterdam, between	{ 1 15 and 1 45 }	15 15	{ 84 0 and 114 0 }	Uncertain.

The great sea-wave of the shock of 1755 appears, from the recorded periods of arrival, to have travelled from its point of origin to the following places at the rates given in miles English per minute, according to Milne; assuming the transit rate uniform for the whole range of translation, which, however, is not possible:—

Plymouth	2·1 miles per minute.
Kinsale	2·7 "
Mount's Bay	2·7 "
Cadiz	3·6 "
Funchal	3·7 "
Ayamento	5·0 "
Lisbon	5·5 "
Antigua	6·0 "
Barbadoes	7·3 "

and that of the shock of 1761, as follows:—

Scilly Isles and Mount's Bay	2·0 miles per minute.
Dublin	2·1 "
Kinsale	2·7 "
Barbadoes	7·4 "

I place these results of Milne's discussions of the imperfect materials at his command, rather for convenience of reference to future investigators than as attaching much value to them beyond rude and provisional approximations*.

* For the same reasons I transcribe the following notice, which has appeared while these sheets have been printing:—

"Direction and velocity of the earthquake in California of the 8th and 9th January 1857 By Dr John B. Trask." *Silliman's Journal*, Jan. 1858, vol. xxv. p. 146.

"The precise time of one of the shocks was obtained with tolerable accuracy for five

We proceed now to France, Belgium, and Holland, the limits of which Perrey fixes somewhat arbitrarily, as bounded on the south by the Mediterranean and by Spain, on the west and north by the Atlantic and Northern Oceans, as far as the Zuyder Zee, on the east by the Rhine and Alps, but comprising within it Geneva, in the basin of the Rhone, and Basle, Manheim, Frankfort-on-the-Main, and some other cities close to the right bank and in the basin of the Rhine.

TABLE VII.—Earthquakes of France, Belgium, and Holland.

Century.	Earthquakes with date of Day or Month.												With date of Season only.		With date of Year only.	Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Winter and Autumn.	Spring and Summer.		
IV. ....	...	...	...	...	...	...	...	...	...	...	...	...	...	—	...	...
V. ....	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1
VI. ....	...	...	...	1	...	1	...	...	...	...	...	1	...	...	3	6
VII. ....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
VIII. ....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
IX.	4	2	1	2	...	...	...	...	3	1	...	4	3	...	1	21
X.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2
XI. ....	...	1	2	...	2	...	2	...	1	3	2	1	...	...	2	16
XII.	3	...	1	2	2	1	...	1	...	...	...	1	...	...	1	12
XIII.	1	1	1	...	...	1	1	...	1	...	...	1	...	...	2	9
XIV.	1	1	1	1	2	1	1	...	2	1	2	1	1	1	6	21
XV. ....	...	1	...	2	...	1	1	2	1	...	3	1	...	1	1	14
XVI.	7	6	3	4	5	2	3	2	6	4	2	5	3	...	7	61
XVII.	13	15	4	4	7	3	7	3	8	4	6	11	...	...	6	91
XVIII.	26	20	17	26	11	18	17	15	13	19	23	28	1	...	4	237
XIX.	27	17	21	13	13	8	15	17	15	17	21	25	1	...	1	211
Total.	83	64	53	55	42	36	47	40	50	48	60	78	9	2	35	702
	Winter 200.			Spring 133.			Summer 137.			Autumn 186.						

localities eastward of San Francisco, the greatest error in time of the clocks being 3' 4", and the least 0' 22". The time, being all reduced to that of San Francisco, gives the following results:—

Locality.	Lat.	Long.	Time of shock.	Elapsed time.	Velocity per min.
	° ' "	° ' "	h. m. s.	m. s.	miles.
San Francisco	37 48	122 35	8 13 30	0 00	0·0
Sacramento	38 39	121 23	8 20 00	7 30	■ ■
Stockton	37 52	121 34	8 23 00	9 30	■ ■
Tejon	35 00	118 46	8 45 00	32 30	6·0
San Diego	32 42	117 13	8 50 00	36 30	7·0

or, for the average of the five observations, 6·2 miles per minute, or 545·6 feet per second. The author says, this closely approximates to Prof. Bache's results as to the rate of the earthquake at Limoda on 23rd December 1854 (Amer. Ass. for Advancement of Science, for that year); but he appears here to confound rate of sea-wave with that of earth-wave or shock."

And for the two months at each critical period of the year—

Dec. and Jan.,	Winter Solstice	161
June and July,	Summer ditto	83
March and April,	Spring Equinox.....	108
Sept. and Oct.,	Autumnal ditto	98

As respects horizontal direction, the relative numbers are,—

N.	to S.	1.50
N.E.	" S.W.	0.43
E.	" W.	1.38
S.E.	" N.W.	0.59
S.	" N.	1.02
S.W.	" N.E.	0.86
W.	" E.	0.91
N.W.	" S.E.	0.69

which, by Perrey's method of calculation, gives for the mean general horizontal direction,—

N. 71° 27' E. to S. 71° 27' W.

To this he not only, in the case of France, confesses that he does not attach much weight, but also states that each century will not give the same mean resultant.

The actually observed districts of shock have been mainly along the lines of the valleys of the Rhine and Rhone, and in an inferior degree along those of the Loire, Seine, Garonne, and Meuse (the Pyrenees being viewed as part of the Spanish region), the tendency being to a direction in length of the valley, others across these. When the physical and geological features of France and the Rhine basin are recalled, it can scarcely be doubted that they constitute a natural independent seismic region, with centres of disturbance connected probably at great depths with the extinct volcanic countries of central France and of the Rhine. The almost continual slight disturbances of St. Maurienne, lasting for more than fifteen months at one time, appear quite analogous to those of Comrie and East Haddam. For the specialities of these and other questions of the French system, however, the memoir itself of Perrey must be consulted.

The basin of the Rhone has been consigned to a separate memoir. The precise limits assigned to the district are not stated; but we must assume them to extend somewhat vaguely beyond the actual catchment of the river. The results are given in

TABLE VIII.—Earthquakes of the Basin of the Rhone.

Century.	Earthquakes with date of Day or Month.												With date of Year only.	Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
XVI.	1	...	1	...	2	1	...	...	3	...	...	1	1	10
XVII. ..	6	3	1	1	3	3	...	1	6	1	...	2	2	29
XVIII. ..	7	5	6	6	3	5	7	4	4	8	6	7	3	71
XIX.	12	12	8	3	3	2	2	4	6	0	8	14	1	81
Total ...	26	20	16	10	11	11	9	9	19	15	14	24	7	191
	Winter 62			Spring 32			Summer 37			Autumn 53				

presenting considerable similarity to the results for France as a whole. The following are the proportional numbers for the months:—

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1·69	1·31	1·06	0·66	0·71	0·71	0·59	0·59	1·24	0·98	0·92	1·37

Or, for Winter	1·35
„ Spring.....	0·69
„ Summer	0·81
„ Autumn	1·16

and for the two months each of

Winter Solstice	1·53
Spring Equinox	0·81
Summer Solstice	0·61
Autumn Equinox	1·05

and as to direction, following his usual method, Perrey arrives at a mean general horizontal resultant,—

S. 9° 44' W. to N. 9° 44' E.

This is not far from the general line of the course of the Lower Rhone; but Perrey remarks that numerous examples occur of shocks whose alleged horizontal movements were orthogonal to the river-valley, and to the meridian.

We pass on to the basin of the Rhine, which, in its entire extent, comprehends, in fact, a large portion of Switzerland, but whose precise limits Perrey does not define.

TABLE IX.—Earthquakes of the Basin of the Rhine and Switzerland.

Century.	Earthquakes with date of Day or Month.												With date of Season only.		Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Autumn and Winter.	Spring and Summer.	
IX.	3	2	1	2	...	1	...	...	1	1	...	5	1	...	19
X. ....	...	...	...	1	...	...	...	...	...	...	...	...	...	...	2
XI. ....	...	2	1	...	2	...	...	...	...	1	...	1	...	...	9
XII.	2	...	...	...	...	1	...	...	...	...	...	...	...	...	8
XIII.	1	...	...	...	...	...	...	...	...	...	...	...	...	1	3
XIV.	1	1	3	1	3	2	1	...	2	1	1	...	1	...	18
XV. ....	...	1	1	1	1	1	1	1	...	3	2	...	...	...	12
XVI.	4	5	4	5	3	2	2	2	6	5	5	6	...	...	52
XVII.	21	14	11	6	10	5	8	6	9	4	2	12	...	...	120
XVIII.	15	12	10	9	6	12	11	10	8	9	17	20	...	...	141
XIX.	15	17	13	12	11	6	12	11	10	17	24	25	...	...	173
Total...	62	54	44	37	36	30	35	30	36	36	59	71	2	1	557
	Winter 150			Spring 103			Summer 101			Autumn 165					

The autumn and winter together here present a number, having nearly the same ratio to that of spring and summer together, as 3 : 2.

And at the critical periods of the year, of two months each, we have

Winter Solstice	133
Spring Equinox	81
Summer Solstice	65
Autumnal Equinox	72

while, as respects horizontal direction,

S. to N.	0.78
N.E. „ S.W.	0.44
E. „ W.	1.33
S.E. „ N.W.	0.89
S. „ N.	2.00
S.W. „ N.E.	1.11
W. „ E.	0.78
N.W. „ S.E.	0.67

and, by calculations on before-given principles, a mean general horizontal direction of

S. 7° 9' E. to N. 7° 9' W.

which corresponds pretty well with the general direction of the river valley. Observation, however, indicates, in most of the localities upon its banks, frequent and wide occasional departures from such direction; and, indeed, in the broken country forming a large portion of its length it is improbable it should be otherwise.

The basin of the Danube.—This vast tract of country has been left very ill-defined as to its limits by Perrey, as respects the subject of his research. His catalogue shows that he does not limit himself precisely to the catchment of this mightiest of European rivers, but, in fact, includes something like the whole of that vast tract of country between a line on the north, reaching from Prague to Kherson; and on the south, from Venice to Constantinople, and even occasionally stretching beyond these limits.

TABLE X.—Earthquakes of the Basin of the Danube.

Century.	Earthquakes with date of Day or Month.												With date of Season only.		With date of Year only.	Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Winter and Autumn.	Spring and Summer.		
V. to XV.	1	1	..	...	2	1	1	1	1	...	...	...	..	...	11	19
XVI.	3	1	..	...	3	4	1	1	3	..	1	1	1	...	16	35
XVII.	2	4	1	...	...	1	2	3	...	..	2	5	...	...	11	31
XVIII.	11	10	4	8	8	5	6	9	1	7	5	8	2	...	4	88
XIX.	14	15	9	8	12	8	16	11	11	16	10	12	1	1	1	145
Total	31	31	14	16	23	19	26	25	16	23	18	26	4	1	43	318
	Winter 76			Spring 60			Summer 67			Autumn 67						

Perrey remarks, that although the total number of shocks recorded appears

great, it is very small in proportion to the enormous area embraced—nearly ten times that of the basin of the Rhone ; and he justly concludes, that, were it not for the penury of records in those regions, so much of which is semibarbarous or thinly inhabited, the total number in it would be far greater than he gives. While the general character of shocks here is not that of great intensity, instances are to be found of some, of disastrous power. The relative numbers are for

Winter Solstice	1·33
Spring Equinox	0·70
Summer Solstice	1·05
Autumnal Equinox	0·91

and as respects horizontal direction, the results are,—

N. to S.	1·33
N.E. „ S.W.	0·50
E. „ W.	1·33
S.E. „ N.W.	0·50
S. „ N.	1·17
S.W. „ N.E.	1·00
W. „ E.	1·33
N.W. „ S.E.	0·85

from which Perrey obtains a mean general horizontal direction of
W. 2° 39' N. to E. 2° 39' S.

This is again very much the line of the Lower Danube itself, which, however, over so vast an area, and fed by vast rivers poured into it on the northern side between great flanking ranges passing more or less north and south, can in reality exercise little or no influence ; and too much stress must not be laid upon any observation as to line of *direction*, even when the azimuth surface may be reliable. This applies to every earthquake country ; uninstructed observers are very liable to mistake the direction of movement, by confounding the direct effects of the shock with those due to inertia of bodies moved. In the Danube basin, it must at present remain undecided whereabouts the centre or centres of disturbance proper to the region are to be found. On the north, the Carpathians probably are above the centre for those whose horizontal direction is more or less north and south ; but whether the shocks from east to west, and veering towards the north or occasionally to the south, have their origin in the Caucasus, or beneath the eastern extremity of the Euxine, or are also in connexion with the great seismic energies that so powerfully and frequently display themselves in Syria and the south-east, indeed all over Asia Minor, yet requires to be investigated.

In the region of the Italian Peninsula, Perrey includes the whole of Italy and the mass of the Alps, exclusive of Savoy (which is included in the basin of the Rhone), with Sicily, Malta, Sardinia, &c., reaching into the centre of the Mediterranean Sea ; and, on the north, all the localities whose watersheds are not into the Rhone, Rhine, or Danube. For the conventional limits which Perrey has fixed for himself in deciding upon the *isolation* in point of time of each distinct earthquake, often in this region continuing for many days with little interruption, the memoir itself must be consulted.

TABLE XI.—Earthquakes of the Italian Peninsula, with Sicily, Sardinia, and Malta.

Century.	Earthquakes with date of Day or Month.												With date of Season only.		With date of Year only.	Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Autumn and Winter.	Spring and Summer.		
IV. ....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	6
V. ....	..	..	..	..	..	..	..	..	..	..	..	..	1	..	4	5
VI. ....	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	3
VII. ....	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1
VIII. ....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2
IX. ....	..	..	..	1	..	1	..	..	..	..	..	1	..	..	■	6
X. ....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	■	3
XI.	1	1	1	1	..	..	..	..	..	..	..	..	..	..	3	7
XII.	2	1	..	..	..	..	..	..	..	1	..	1	1	..	12	18
XIII.	1	..	..	2	1	..	..	..	1	..	1	1	..	..	6	15
XIV.	■	1	..	..	1	1	..	..	3	..	2	■	..	..	6	20
XV. ....	..	1	1	..	1	..	..	1	..	1	..	6	..	..	7	18
XVI.	2	..	1	1	3	1	1	1	2	..	2	2	1	..	13	■
XVII.	10	16	14	15	4	13	8	7	10	4	6	3	2	1	9	121
XVIII.	45	41	43	29	38	46	21	31	24	44	31	30	2	1	12	438
XIX.	37	39	38	35	32	24	33	36	23	41	22	29	..	..	1	390
Total ...	101	99	98	84	80	86	63	77	63	92	64	77	7	2	92	1065
	Winter 298			Spring 250			Summer 203			Autumn 233						

M. Perrey, having obtained access to the work of Muratori and other documents, produced a supplement to this memoir, the result of which he has given in

SUPPLEMENTAL TABLE XII.—Italian Peninsula, Sicily, Sardinia, and Malta.

Century.	Earthquakes with date of Day or Month.												With date of Year only.	Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
VIII. ....	..	..	..	..	..	..	..	..	..	..	..	..	1	1
IX. ....	..	..	..	..	..	..	..	..	..	..	..	..	..	..
X. ....	..	..	..	..	..	..	..	..	..	..	..	..	3	3
XI. ....	..	..	..	1	..	..	..	..	2	..	..	..	2	5
XII.	4	..	..	1	2	1	..	1	..	1	..	..	12	22
XIII.	2	..	..	2	1	1	2	1	..	2	3	1	11	26
XIV.	5	5	6	2	4	2	4	1	6	3	1	6	6	51
XV.	5	2	4	2	3	3	1	10	5	1	4	5	2	47
XVI.	1	..	..	1	1	■	..	..	..	..	..	..	1	5
XVII. ....	..	..	2	4	..	..	1	..	1	1	..	..	..	9
XVIII.	1	1	1	2	1	3	2	2	1	4	1	..	1	20
XIX.	7	5	10	8	8	10	8	10	4	4	4	10	..	88
Total ...	25	13	21	23	20	21	18	25	19	16	13	22	39	277
	Winter 61			Spring 64			Summer 62			Autumn 51				

In the first of these, the winter and spring earthquakes together are to the summer and autumn together

as 6 : 5.

In the supplemental table taken alone, however, the winter season has lost its preponderance, and autumn shows the smallest number.

The number in winter and autumn together, however, still slightly exceeds that for spring and summer, in the ratio of 9 : 8.

While this shows the usual doubtfulness of generalizations from partial data, the result rather tends to awaken increased attention to the very prevalent excess of seismic action in the winter half-year, shown by so many catalogues, and here sustained, though by a supplement, that, taken alone, somewhat departs from the principle.

As regards direction, he finds

N.	to S.	.....	0.82
N.E.	" S.W.	.....	1.08
E.	" W.	.....	1.94
S.E.	" N.W.	.....	1.29
S.	" N.	.....	1.29
S.W.	" N.E.	.....	0.40
W.	" E.	.....	0.91
N.W.	" S.E.	.....	0.28

and the mean general horizontal direction of resultant

S. 72° 27' E. to N. 72° 27' W.

Observation by no means accords with any such general mean direction. It has repeatedly indicated movements in Italy and Sicily in every azimuth—perhaps with some greater prevalence of those from north to south, and the reverse; but the fact appears to be that these regions have their centre of disturbance almost directly beneath, and hence, as is the case in South America, and the Moluccas, Philippines and Sunda Islands, the emergence of the wave generally makes an extremely large angle with the horizon; and the horizontal component is ill-suited to easy observation. The most fearful earthquakes with which this region has been visited, and whose force has reached France, Germany, Holland, and England, and into Africa, are said to have had a point within their immediate circuit where the shock was absolutely vertical, as in the Riobamba earthquake recorded by Humboldt.

The memoir of Perrey on Algiers and Northern Africa is brief; and he laments that the want of information, and of access to sources of it not attainable, prevented his collecting a sufficient number to found any generalization upon. The following results alone he is able to tabulate:—

TABLE XIII.—Earthquakes of Algeria and Northern Africa.

Earthquakes with date of Month.												With date of Year only.	Total.
January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
5	2	6	7	3	2	2	5	1	4	6	1	17	63
Winter 13			Spring 12			Summer 8			Autumn 13				

The want of further historic information upon this region is much to be regretted. It has been, since anything has been recorded of it, known as subject to earthquakes. Cities, the sites of bishoprics in the ancient Christian church of Africa, were thus demolished, and now astonish the traveller amidst rocky solitudes by acres of hewn stone on the sites of prostrate edifices that mark the past magnificence of Carthaginian and Roman rule. And at the present day, earthquakes are frequent and serious, as the many edifices erected by the French since they have been in possession of Algeria, and since thrown down, demonstrate.

Whether, as a seismic region, Northern Africa have a centre of disturbance of its own, and if so, whether this exists deep within the little-known recesses of the Atlas chain, or beneath the southern verge of the Mediterranean basin, or whether its disturbances are only derivative, and have their centre either in the volcanic region of the Canaries or amongst the towering peaks of Abyssinia, all yet remains to be discovered. No information worthy of any confidence has reached me as to the general horizontal direction of shocks in this region. How much to be desired is it, that the government of the Emperor of the French would systematize seismoscopic observations in their African possessions!

The last of Perrey's European series now comes before us; and in the following table he has given the results for—

TABLE XIV. — Earthquakes of the Turco-Hellenic Territory, Syria, the Ægean Islands, and Levant.

Century.	Earthquakes with date of Day or Month.												With date of Season only.		With date of Year only.	Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Autumn and Winter.	Spring and Summer.		
IV.							1	1		1		1	3	1	15	23
V.	1		1	3		1			3		1				9	■
VI.	1	1		1	1		2	2	2	3	2	2			10	27
VII.				1		1									6	8
VIII.	2	2	1	1	1					1				1	3	12
IX.	1				1			2					1		2	7
X.									2	2	1					5
XI.	1	2	1			1		1	1		1	3			7	19
XII.					1	1						2			19	23
XIII.			1		1	1						1			9	13
XIV.		1	1					2						1	3	8
XV.				1					1	1	1				7	11
XVI.			2		2	1			1		1	1			14	22
XVII.	3	1	3	4	4	1	6	2	5	1	5	1			17	53
XVIII.	9	8	5	9	10	13	12	8	11	8	9	8	2		12	124
XIX.	22	20	16	10	16	15	14	22	14	17	12	14	2	2	1	197
Total ..	40	35	31	30	37	35	35	40	40	34	33	33	8	5	134	570
	Winter 106		Spring 102		Summer 115		Autumn 100									

This vast region embraces the Turco-Greek peninsula, from Trieste to Constantinople southward of the Balkan range, the Greek Archipelago and Asia Minor to Bagdad, with a portion of Syria and the Levant.

Perrey remarks, that the number of facts he has been able to collect are

fewer than the known seismic character of the region warrants, and rightly attributes this to want of record, and to the want of communication in these parts of the world. He also remarks (what has been pointed out in the Second Report as applying to Antioch, &c.) that here seismic energy appears to have been in various localities extremely paroxysmal in its action, with long periods of intermediate cessation. In the Turco-Greek peninsula, earthquakes have long been both frequent and formidable.

For the four critical periods of the year he finds

Winter Solstice	73
Spring Equinox.....	61
Summer Solstice	70
Autumnal Equinox	74

Pouqueville (' Voyage en Grèce') has given some very singular facts and speculations as to the time of year of earthquakes in Epirus, &c., in relation to the rains. They need inquiry and confirmation.

In analysing the horizontal direction of shock, Perrey has deemed it proper to separate the region under three sub-districts, in consequence of the broken character of the Greek peninsula, and the very diverse *orientation* of the coasts, river-courses, and mountain-ranges throughout all its parts.

Directions.	Adriatic. Trieste to Zanté.	Constantinople.	Smyrna.	Total.
N. to S. ...	4	2	2	9*
N.E. to S.W. ...	...	...	...	...
E. to W. ...	2	...	...	3†
S.E. to N.W. ...	1	...	...	1
S. to N. ...	4	1	1	6
S.W. to N.E. ...	1	...	...	1
W. to E. ...	3	...	...	3
N.W. to S.E. ...	2	1	1	5‡

These figures are meagre enough. By the usual method, Perrey calculates a mean general horizontal direction of shock,

$$N. 34^{\circ} 37' W. \text{ to } S. 34^{\circ} 37' E.$$

The deduction, however, is plainly in this instance of little value. Many shocks in this region have been described as approximating to vertical; and this is to be anticipated from one having a centre of disturbance almost in its midst with active volcanic action. All its eastern end, Syria, &c., however, has some separate centre of disturbance, either in connexion with the eastern chains of Asia Minor, which appear to abound in igneous formations or with the Southern Arabian centre; while Constantinople, the Dardanelles, and the western and southern shores of the Euxine may also be in connexion with the Caucasian centre of action.

We have now completed Perrey's European series. He passes to the American by the discussion of the basin of the Atlantic, viewed as comprehending all from Iceland on the north to 'Tristan d'Acunha on the south, and on the east and west everything between the shores of the continents of the New and Old Worlds.

Within this oceanic expanse no less than five great and probably connected centres of volcanic action exist: Iceland, the Azores, the Canaries,

* Including once for Aleppo.

† Including once for Thassia.

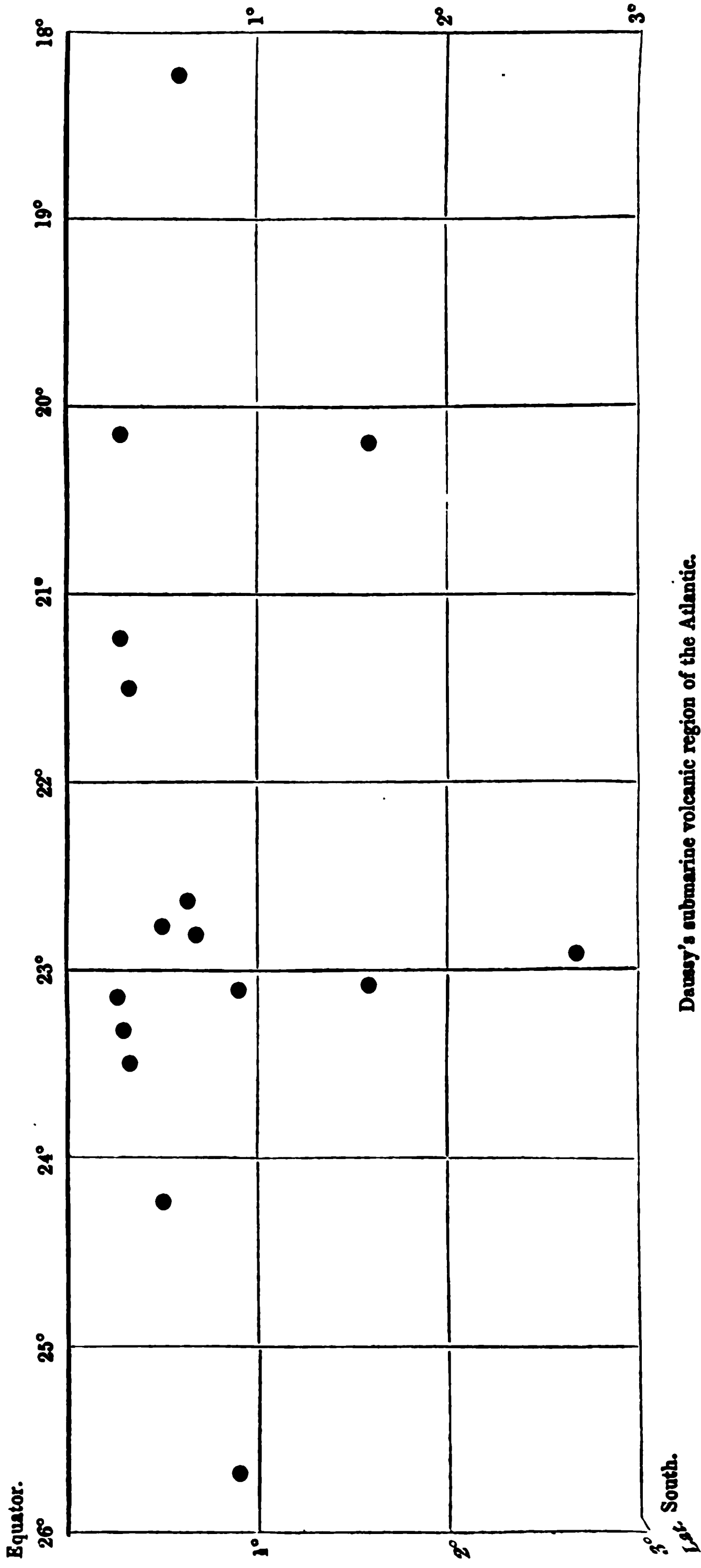
‡ Including once for Latakia.

the Cape de Verde, the West India Islands, and the great submarine volcanic region first noticed by M. Daussey, besides many other points, as Ascension, St. Helena, St. Paul's, &c., at which extinct volcanic phenomena are visible. The number of observations, however, as yet recorded of earthquake-shocks within the basin is so very small, that Perrey has been only able to collect from 130 to 140 instances between the years 1430 and 1847, or about three a year on the average; so that he does not deem the basis large enough to warrant any numerical discussion. The observations of M. Daussey, "Sur l'existence probable d'un volcan sousmarin situé par environ $0^{\circ} 20'$ de lat. S. et $22^{\circ} 0'$ de lon. ouest," published in vol. vi. p. 512, 'Comptes Rendus de l'Académie' (1853), have, however, made this one of the most interesting seismic regions on the globe.

M. Moreau de Jonnés ('Comptes Rendus,' vol. vi. p. 302) has given two recorded observations on board French ships, the 'César' and the 'Sylphide,' which render the existence of a submarine volcanic tract on the bank of Bahama highly probable; but M. Daussey has collected and given observations of shocks received by vessels at sea at various periods, but all within a given limited area, which renders the existence almost certain of a vast active volcanic suboceanic area in the basin of the Atlantic, nearly midway between Cape Palmas on the west coast of Africa, and Cape St. Roque on the east coast of South America, or in the narrowest part of the ocean between these continents. This vast disturbed and perhaps partially igneous ocean-floor can be no less than nine degrees in length from west to east, and from three to four degrees in breadth from north to south. The following are the observations given by Daussey; and the relative positions of the several recording ships are given in the diagram (fig. A.):—

- 17th Oct. 1747.—The ship 'Le Prince,' Bobriant: two shocks. Lat. $1^{\circ} 35'$ S.; long. $20^{\circ} 10'$ W.
- 5th Feb. 1754.—The ship 'Silhouette,' Pintaul: one shock, with trembling. Lat. $0^{\circ} 20'$ S.; long. $23^{\circ} 10'$ W.
- 13th April 1758.—The frigate 'Fidèle,' Lehoux: several shocks. Lat. $0^{\circ} 20'$ S.; long. $23^{\circ} 10'$ W.
- 3rd May 1761.—The ship 'Le Vaillant,' Bouvet: saw an islet of sand above water, in lat. $0^{\circ} 23'$ S. and long. $21^{\circ} 30'$ W.
- 3rd Oct. 1771.—The frigate 'Le Pacifique,' Bonfil: one shock and trembling. Lat. $0^{\circ} 42'$ S., and long. by estimation, $22^{\circ} 47'$ W. An agitated sea, and no bottom found on sounding.
- 19th May 1806.—M. de Krusenstern (ship's name not given). Lat. $2^{\circ} 43'$ S., and long. $22^{\circ} 55'$ W. Saw columns of smoke twelve or fifteen miles to the N.N.W., which he and Dr. Horner attributed to volcanic submarine eruption.
- 18th Dec. 1816.—The ship 'The Triton,' Proudfoot: in lat. $0^{\circ} 23'$ S., and long. $20^{\circ} 6'$ W., passed over a shoal of about three miles from east to west, and one mile from north to south. Twenty-six fathoms water, with bottom of brown sand.
- 12th April 1831.—The ship 'Eagle,' J. Taylor: in lat. $0^{\circ} 22'$ S., and long. $23^{\circ} 27'$ W., the sea being perfectly calm; one violent shock: the rudder was powerfully shaken, and a muffled sound was heard from beneath.
- Nov. 1832.—The ship 'La Seine,' Le Maire, in lat. $0^{\circ} 22'$ S., and long. $21^{\circ} 15'$ W. Under easy sail; one powerful shock.
- 9th Feb. 1835.—The barque 'The Crown,' of Liverpool (captain's name not given): lat. $0^{\circ} 57'$ S., and long. $25^{\circ} 39'$ W. When going six knots, was thought suddenly to have struck on a coral rock and to have

Fig. A.



Dausy's submarine volcanic region of the Atlantic.
Places at which the shocks have been felt. Long. W. from Paris.

grated over it; but on sounding directly after, found 135 fathoms water.

28th Jan. 1836.—The ship 'Philantropie de Bordeaux,' *Jayer*: in lat. $0^{\circ} 40' S.$, and long. $22^{\circ} 30' W.$ Violent shock and trembling for three minutes.

13th & 16th March 1836.—The American ship 'St. Paul,' of Salem (captain's name not given), being ten miles to the west of the 'Philantropie,' perceived the same shock.

— in 1836 Captain Fergusson, of the ship 'Henry Tanner,' presented to the Royal Asiatic Society of Bengal, through F. L. Huntley, Esq., volcanic ashes or cinders, like black pumice, which he had found on the surface of the sea when much agitated, in lat. $0^{\circ} 35' S.$ and long. $18^{\circ} 10' W.$

— In a previous voyage Captain Fergusson, in lat. $1^{\circ} 35' S.$ and long. $23^{\circ} 5' W.$, was alarmed by a violent shock, accompanied by a great noise, as if he had struck upon a rock, but could find no bottom on sounding.

Some other instances are said to be found in the 'Sailing Instructions for the Azores' by Tofino, translated by M. Urvol de Portzamparc, in the 'Annales Maritimes de France,' which I have not been able to consult. We possess enough, however, to indicate that a submarine volcanic tract is in activity beneath the Atlantic, as large in area as Great Britain, and that the bottom of the ocean there is rendered uneven in the extreme, immense protrusions taking place in deep water. How desirable would it be that some British ships were commissioned to examine this tract more perfectly, especially to obtain accurate soundings and sectional lines of the bottom from east to west and from north to south, and, if possible, to obtain, by dredging or otherwise, good specimens of the material of the bottom, and also observations of the temperature of the sea at various depths!

Our knowledge of the distinguishing marks of suboceanic and subaerial volcanic ejecta, of the chemical reactions producing mineral species, under the conditions (so vaguely understood as yet) of high temperature and great pressure in presence of water, might receive important accessions, if such specimens from the bottom could be obtained from thence (or from other similar positions), while our ideas of the extent to which local ocean currents may be produced and maintained by the local heating of the deep sea immediately above such volcanic tracts might be enlarged, and other trains of future research suggested.

Above all, how forcibly does the existence (so far almost unnoticed and unknown) of this vast volcanic and seismic submarine region indicate the desirableness of having henceforth a well-arranged system of scientific observation and mode of daily entry in the log-book made part of the duties of ships of every civilized maritime nation, and having such entries referred to a special office (with us, probably, in connexion with the Admiralty or with a revived Board of Longitude) for extract, record, and discussion! That certain classes of observations could not be made on board our ships at present, although the zeal of our officers of the navy and of some of the mercantile marine might be counted on, is certain; but it is equally so that very many of the highest value to cosmical science could be made and recorded, if the system were once arranged, the classes of observation determined on, properly ruled and arranged log-books prepared, and the making certain observations (to be determined on by the central board beforehand in each instance) made matter of duty. Navigation and commerce would gain, eventually, quite as much as, by the small sacrifice of time and labour.

they thus gave to science. I venture respectfully to commend it to our own, to the American, and to all European governments.

In his memoir on the Earthquakes of the United States and Canada, Perrey may be said to include the whole northern continent of America, with the exception of Mexico and Central America, to which he has devoted another memoir.

The two following tables, XV. and XVI., give the results of his discussion:—

TABLE XV.—Earthquakes of the United States and of Canada.

Century.	Earthquakes with date of Day or Month.												Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
XVII.	3	1	...	...	...	1	...	...	...	1	...	...	10
XVIII. ...	7	9	9	3	3	3	6	8	5	7	12	12	88
XIX.	4	4	3	3	3	...	...	6	3	2	7	5	51
Total ..	14	14	12	6	6	4	10	14	8	10	19	17	149
	Winter 40			Spring 16			Summer 32			Autumn 46			

Here the number of earthquakes in autumn and winter are to those of summer and spring as 88 to 49, or nearly as 2 to 1; and for Perrey's critical periods:—

Winter solstice.....	31
Spring equinox.....	18
Summer solstice	14
Autumnal equinox	18

Perrey wholly disputes the verity of Humboldt's conclusion ('Cosmos,' t. i. p. 519, trad. p. M. Faye) that earthquakes are most frequent at the equinoxes, and declares that the results of all his memoirs prove the contrary.

He discusses from his catalogue the relative number of shocks in each State of the Union; but this is comparatively of less importance to science than to social life. He has not been able to ascertain the northern limit of seismic action, but sees ground to believe it has reached Greenland more than once, but that frequent shocks pass no further north than the Canadas.

The only records with direction of motion given are twelve in number, viz.,—

N.W. to S.E.	6
W. " E.	3
N.E. " S.W.	2
E. " W.	1

and calculating, upon his already known method, the mean direction from this narrow base, he finds it

N. $31^{\circ} 54'$ W., to S. $31^{\circ} 54'$ E.;

but he confesses his own opinion, derived from a broad view of all the facts and the topographic character of the country, to be, that the prevailing direction is from north to south, or the contrary.

The vertical component of motion has only been given in one instance here; but there is every reason to presume that the angle of emergence of the seismic wave all over the northern continent of America is steep.

TABLE XVI.—Earthquakes of Mexico and Central America.

Century.	Earthquakes with date of Day or Month.												With date of Year only.	Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
XVI. ....	..	..	..	..	..	..	..	..	..	..	1	..	5	6
XVII. ....	..	1	2	..	..	..	..	..	..	1	..	..	3	7
XVIII. ....	..	2	4	3	..	3	2	1	3	..	..	..	6	24
XIX.	3	2	2	2	6	2	2	1	1	3	2	3	1	30
Total.	3	5	8	5	6	5	4	2	4	4	3	3	15	67
	Winter 16			Spring 16			Summer 10			Autumn 10				

The steep emergence of the wave is most remarkable in Mexico, where, at Acapulco, it is frequently felt as a directly vertical pulse from beneath (as at Riobamba).

Perrey does not attempt, from his materials, a full discussion of the horizontal component of motion. The prevailing impression in Mexico is that the direction of shock is parallel to the chain of the Cordilleras. Some, however, of the most remarkable shocks have apparently moved at right angles to the preceding.

The truth is, in a wide region situated close to, and no doubt in great part close *above*, vast centres of disturbance, whose pulses reach the surface generally with large angles to the horizon, there must be horizontal components in every azimuth, and only distinguishable in one more than another, as the accidents of the originating blows, of the heterogeneous formations through which they are transmitted, and the opportunities of exactness of observation, &c. vary.

Perrey concludes this memoir with a *résumé* of the labours of Arago, Von Buch and Berghaus, on the volcanoes of Mexico and the Andes.

In his memoir on the Antilles, Perrey includes Cuba, which has also been the subject of research to M. Poey, now stationed at the Observatory of Havanna—with Hispaniola, Jamaica and Porto Rico in the greater, and in the lesser isles Antigua, Barbadoes, St. Christopher's, Guadalupe, Martinique, Granada, Trinidad, St. Thomas, Santa Cruz, Dominica, St. Vincent, Tobago, and St. Lucia, &c. In discussing the copious materials at his disposal in this vast region, Perrey has found it necessary to adopt certain conventional licences with reference to some of the very prolonged earthquakes, whose slight but continuous shocks have often (as at Comrie and East Haddam) lasted for a great length of time, reckoning each month of such shocks as equivalent to one great earthquake.

In the following table, XVII., he has given the distribution in time:—

TABLE XVII.—Earthquakes of the Antilles.

Century.	Earthquakes with date of Day or Month.												With Season only.		With date of Year only.	Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Winter and Autumn.	Spring and Summer.		
XVI. ....	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1
XVII.	1	1	1	1	1	1	1	...	...	...	...	...	...	...	10	16
XVIII.	2	3	4	3	5	10	7	8	10	5	3	...	...	...	13	85
XIX.	9	8	19	12	12	10	9	16	12	10	13	12	1	...	2	145
Total ...	15	16	23	17	16	16	20	23	23	20	18	15	1	...	25	247
	Winter 54			Spring 49			Summer 65			Autumn 53						

Contrary to the result usual for Europe, the number of shocks in summer here seems to preponderate; and in the critical periods we have—

Winter solstice	30
Spring equinox	40
Summer solstice	36
Autumnal equinox	42

or for autumn and winter together 108; spring and summer 114,—a result equally contrary to what has been found so uniformly for Europe, and to the prevalent belief of the inhabitants of the islands themselves, who deem the equinoxes the dangerous times.

Representing by unity the mean degree of frequency, and by 12 the whole number of earthquakes given with date of month, we find for each month the following proportional number:—

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
0·81	0·87	1·25	0·92	0·87	0·87	1·09	1·25	1·19	1·09	0·98	0·81
0·98			0·89			1·18			0·96		

As regards horizontal direction of shock, his data give—

E. to W.	9
S. „ N.	5
N. „ S.	3
W. „ E.	2
N.E. „ S.W.	2

from which, by his usual method, he deduces a mean horizontal direction—

E. $22^{\circ} 5'$ S. to W. $22^{\circ} 5'$ N.;

and it is worthy of remark, that Deville gives, as greatly disturbed in 1843, the zone running parallel to the great circle of W. 35° N. to E. 35° S.,

or E. 35° S. to W. 35° N., which is about parallel also to Perrey's mean direction. It must not be forgotten, however, that, in 1812 and in 1848, shocks were observed at right angles to this, and in some cases, as in 1770, in all azimuths; and also that the prevalent opinion of the inhabitants of the West Indian Islands is, that they have a general north and south horizontal direction, thus coming within the scope of the general direction of similar phenomena on the northern and southern continents of America.

M. Poey, of the Observatory, Havana, has published, in the 'Nouvelles Annales des Voyages' for 1855, a memoir and supplement upon the earthquakes of Cuba, separately, with copies of which he has obligingly furnished me. It would be out of place in this Report to discuss M. Poey's views as to the connexion between cyclones, or other storms, and earthquakes, or as to the physical causes of the impulse producing shocks. As regards the first, it may, however, be remarked in passing, that violent and sudden local change of barometer-pressure must (as I have indicated in a former report) be viewed as a *possible inducer* of such reactions beneath the surface as may possibly result in earthquakes; and that as respects the part which water, under heat and pressure, may play in its spheroidal state, I have also indicated fully as much as the present state of our knowledge will sustain. As respects the statistic results of M. Poey's labours, they are embraced in the following table, which combines the facts of both memoir and supplement:—

TABLE XVIII.—Earthquakes of Cuba.

Century.	Earthquakes with date of Day or of Month.												Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	With date of Year only.
XVI. . . .													4
XVII. . . .		4											4
XVIII. . . .													2
XIX. . . .	4	3	2	3	3	4	5	2	6	5	6	4	3
Total . . .	4	7	2	3	■	4	5	2	6	5	6	4	9
	Winter 13			Spring 10			Summer 13			Autumn 15			

Cuba, therefore, appears to show 28 earthquakes in the winter and autumn, and 23 only in the summer and spring.

The surface of this single island is, however, perhaps too small to attach much importance to its isolated discussion*.

The last of Perrey's monographic memoirs is that on Chili and La Plata,

* While this Report has been passing through the press, I have received from M. Poey a copy of his later and more elaborate "Chronological Catalogue of Earthquakes in the West Indies, from 1530 to 1857, extracted from 'l'Annuaire de la Société Météorologique de France,' tom. v. p. 75, Séance du 25 Mai, 1857," and regret that the limits of a foot-note preclude the possibility of analysis of his valuable memoir.

Of a total of 690 earthquakes, he finds that 142 occurred in winter, 156 in spring, 187 in summer, and 154 in autumn,—thus so far corroborating Perrey's result deduced from a smaller base.

A very complete Seismic Bibliography for the Antilles concludes M. Poey's memoir.

or the region lying between the western slope of the Andes and the sea, from the 25° to the 45° south latitude, between the Desert of Atacama on the north, and the Archipelago of Chonos on the south.

The following table contains his numerical results for a region, however, in which shocks of greater or less intensity are almost of daily occurrence:—

TABLE XIX.—Earthquakes of Chili and the basin of La Plata.

Century.	Earthquakes with date of Day or Month.												Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	With date of Year only.
XVI. ....	..	..	..	..	1	..	..	..	..	1	..	..	5
XVII. ....	..	1	1	..	1	..	..	..	..	..	..	..	3
XVIII.	1	1	1	..	1	1	..	1	..	..	..	1	10
XIX.	14	10	14	8	12	11	16	15	16	9	27	8	170
Total ...	15	12	16	8	21	12	16	16	16	10	27	9	194
	Winter 43			Spring 41			Summer 48			Autumn 46			

From this table he has omitted several earthquakes, whose period has been prolonged to several weeks or even months, by a convention like that adopted here with regard to the memoir of Comrie, &c.

A table of earthquakes noticed as occurring in Peru from A.D. 1810 to 1835, by M. Castelnau, was presented to the Academy of Sciences in 1847, by Arago ('Comptes Rendus,' 2 Nov. 1847); but the catalogue itself is not given, and I am not aware that it has appeared elsewhere.

M. Lambert, mining engineer of Chili, in a memoir on the causes of earthquakes in Chili and Peru ('Ann. de Chim. et de Phys.' t. xlii. pp. 392-405), published in 1829, mentions that the Chilians vulgarly divide their year into three seasons or "temporadas," and that one of these, the first, composed of January, February, March, and April, is called "temporada de los temblores," or earthquake season; on comparing the facts of his catalogue, with the popular belief however, Perrey finds the facts palpably contradict it.

As to the prevalent horizontal direction here, Perrey makes no attempt to discuss it, contenting himself with the remark, that the popular belief is universal in the region, that it follows the chain of the Cordillera. In a country, however, having so little of its *observed* surface (for the great sandy deserts are nearly unknown as respects our inquiry) of a level character, with a general seaward slope from the great central axis, and with the origin of disturbance so closely beneath, that many of the most formidable earthquakes have emerged almost vertically over considerable tracts, the attempt to fix a prevailing horizontal direction would be nugatory.

Finally, we come to the two last of Perrey's memoirs which have been referred to—those in which he has brought under one view many of the facts of his monographs, and graphically discussed the results in tables for all Europe, with the adjacent parts of Africa and of Asia, and for the north of Europe with the north of Asia, viewed as one great boreal band. The results of the former are given in the following Table:—

TABLE XX.—Résumé of the Earthquakes of Europe, and of the adjacent parts of Asia and of Africa, from A.D. 906 to 1843.

Century.	Earthquakes with date of Day or Month.												With date of Season only.	With date of Year only.	Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Winter and Autumn.	Spring and Summer.	
IV.							1			1		2	3	1	19
V.	1			3		2	1		9		2		3		11
VI.		1		2	2	1	2	1	2	3	2	3	1		11
VII.				1		1		2							6
VIII.	2	2	1	1	1								1		3
IX.	4	2		1	1	1		1	2	2		6	5	1	10
X.	1		1	1					1	2	1	1	1		8
XI.	1	4	5	1	2	1	2	2	4	2	2	3	1		19
XII.	8	2	2	3	23	2		3	3		1	4	3		34
XIII.	2	2	3		5		2		1		2	5			27
XIV.	1	1	3		3	4	3	2	4	3	4	4	2	2	22
XV.		1	1	1	2	2	2	2	1	2	2	7		1	17
XVI.	10	5	6	5	10	4	2	3	9	3	6	10	3		31
XVII.	21	16	15	13	6	9	10	3	14	3	10	17	1	1	41
XVIII.	77	53	45	52	38	49	49	49	32	62	55	62	14	4	21
XIX.	99	100	90	59	55	55	74	78	72	92	60	78	6	1	6
Total ...	228	189	172	147	196	131	148	147	147	176	148	302	48	■	379
	Winter 539			Spring 404			Summer 442			Autumn 526					

Autumn and winter still preponderate thus for entire Europe. As regards the "critical periods" of the year, the results are—

	For XIX. Century.	For the whole period.
Winter solstice	177	253
Spring equinox	151	170
Summer solstice	129	150
Autumnal equinox	164	159

and for the half year, and XIX. century only—

Autumn and Winter	527
Spring and Summer	394

and for the whole period of nearly 15½ centuries—

Autumn and Winter	1165
Spring and Summer	957

or about as 1 : 0·75.

The mean *annual* number of earthquakes in Europe, &c., deduced from the data of the ten years between 1833–1842, while it was everywhere at peace, and intelligence well conveyed, Perrey finds to be nearly 33 per annum. He considers that one-fifth more may probably have occurred that have not come to his knowledge, so that the mean annual number would be 40, or between 4 and 5 per month.

The remainder of this memoir is occupied with remarks upon very numerous and interesting secondary phenomena, recorded of the earthquakes referred to in the catalogue discussed.

In the last memoir—that in which Perrey discusses the earthquakes of northern Europe and northern Asia together—he expresses with some caution his own belief that the preponderance of seismic phenomena in the winter half-year above the summer half, is the ratio above given, is worthy of acceptance as an empiric law for Europe at least, but doubts whether it may be extended to the other hemisphere.

The geographical limits of this seismic region are somewhat arbitrary, reaching from the Elbe on the west to the extremity of Kamtschatka on the east; bounded on the north, in Europe, by the Baltic and White Seas, but in Asia reaching to the Arctic shores; and on the south, in Europe, by a great circle passing north of the Carpathian Mountains to the Euxine, the Caucasus and the Caspian, and thence by the Desert of Gobi to the Sea of Okhotsk—a vast tract, containing many important mountain-chains, though principally distinguished, as Perrey remarks, by its immense plains and low table-lands.

The eight following tables give not only his numerical results for this region, but a general comparative view of the numerical results of nearly the whole of his memoirs, for which I have somewhat extended some of the tables, and changed their order slightly.

TABLE XXI.—Earthquakes of the Northern Zone of Europe.

Century.	Earthquakes with date of Day or Month.												Season only.		With date of Year only.	Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Winter and Autumn.	Spring and Summer.		
VIII. to XVI.	2	1	1	1	3	2	1	2	1	...	1	...	...	2	3	25
XVII.	3	5	...	...	...	...	...	1	1	...	2	2	...	...	4	19
XVIII.	10	7	4	4	4	1	2	3	4	4	2	2	1	...	...	54
XIX.	12	5	4	5	6	3	2	4	2	9	7	6	...	...	...	65
Total ...	27	18	9	11	13	6	5	12	8	13	13	13	1	2	12	163
	Winter 54			Spring 30			Summer 25			Autumn 39						

TABLE XXII.—Earthquakes of the Northern Zone of Asia.

Century.	Earthquakes with date of Day or Month.												With Season only.		With date of Year only.	Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Winter and Autumn.	Spring and Summer.		
XVIII.	3	3	2	1	1	...	...	2	2	2	1	2	1	...	7	33
XIX.	4	6	6	4	4	3	5	7	6	3	4	3	...	...	...	57
Total ...	7	12	8	5	5	3	5	9	8	5	5	5	1	—	7	89
	Winter 27			Spring 13			Summer. 23			Autumn 18						

TABLE XXIII.—Earthquakes of the Northern Zone of Europe and of Asia together.

Century.	Earthquakes with date of Day or Month.												With Season only.		With date of Year only.	Total.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Winter and Autumn.	Spring and Summer.		
VIII. to XVI.	2	1	1	1	3	2	1	2	1	..	1	..	..	2	8	25
XVII.	1	5	..	1	1	..	..	1	1	..	2	2	..	..	4	20
XVIII.	13	13	6	5	5	1	3	7	6	6	4	2	2	..	7	86
XIX.	16	11	10	9	10	6	7	11	6	12	11	11	..	..	..	122
Total ...	34	30	17	16	19	9	11	21	16	18	18	21	2	2	19	353
	Winter 81			Spring 44			Summer 48			Autumn 57						

TABLE XXIV.—General Result as to Mensual Relative Frequency of Earthquakes.

Regions.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual ratio.
Europe (the whole) ...	1.35	1.11	1.07	0.95	0.85	0.81	0.87	0.95	0.89	1.02	0.93	1.21	34.32
France and Belgium .	1.52	1.17	0.97	1.01	0.77	0.68	0.86	0.73	0.91	0.88	1.09	1.43	7.02
Italy and Savoy	1.16	1.13	1.27	1.05	0.96	0.96	0.94	0.94	0.76	1.13	0.76	0.94	10.83
Basin of the Rhone ...	1.69	1.31	1.06	0.66	0.71	0.71	0.59	0.59	1.24	0.98	0.92	1.57	1.21
Basin of the Danube...	1.38	1.38	0.62	0.71	1.11	0.84	1.16	1.11	0.71	1.02	0.80	1.16	3.18
Scandinavia	1.85	1.12	1.18	0.75	0.80	0.56	0.95	0.73	1.01	0.95	1.06	0.95	2.52
Europe, Northern Zone	2.19	1.46	0.73	0.89	1.05	0.49	0.43	0.98	0.66	1.05	1.05	1.05	1.63
Asia, Northern Zone...	1.04	1.78	1.19	0.74	0.74	0.44	0.89	1.33	1.19	0.74	0.74	1.19	.89
Both Zones united ...	1.78	1.57	0.89	0.84	0.94	0.47	0.58	1.10	0.84	0.94	0.94	1.10	2.52

TABLE XXV.—Result as to Relative Frequency in Season.

Region.	Winter.	Spring.	Summer.	Autumn.
Europe (the whole) ...	1.18	0.87	0.90	1.05
France and Belgium ...	1.22	0.81	0.83	1.13
Italy and Savoy	1.19	0.99	0.88	0.94
Basin of the Rhone ...	1.35	0.69	0.81	1.16
Basin of the Danube...	1.13	0.89	0.99	0.99
Scandinavia	1.38	0.73	0.99	0.99
Europe, Northern Zone	1.49	0.81	0.69	1.05
Asia, Northern Zone...	1.33	0.67	1.13	0.89
Both Zones united ...	1.41	0.75	0.84	0.99

TABLE XXVI.—Result as to Relative Frequency at the Equinoxes and Solstices.

Region.	Winter Solstice.	Spring Equinox.	Summer Solstice.	Autumnal Equinox.
Europe (the whole) ...	1.25	0.89	0.89	0.93
France and Belgium ...	1.43	0.96	0.73	0.87
Italy and Savoy.....	1.02	1.13	0.93	0.92
Basin of the Rhone ...	1.53	0.81	0.81	1.05
Basin of Danube	1.33	0.70	1.05	0.91
Scandinavia	1.36	0.94	0.74	0.95
Europe, Northern Zone	1.74	0.87	0.48	0.91
Asia, Northern Zone...	1.20	1.04	0.73	1.04
Both Zones united ...	1.44	0.96	0.59	0.98

TABLE XXVII.—Result as to Relative Directions of Horizontal Component of Shock.

Region.	N. to S.	N.E. to S.W.	E. to W.	S.E. to N.W.	S. to N.	S.W. to N.E.	W. to E.	N.W. to S.E.	Total.
Europe (the whole) ...	1.57	0.65	1.65	0.67	1.12	0.88	0.88	0.60	464
France and Belgium ...	1.50	0.43	1.88	0.59	1.02	0.96	0.91	0.69	149
Italy and Savoy.....	1.09	0.81	2.25	0.91	1.09	0.51	0.87	0.29	110
Basin of the Rhone ...	1.30	0.37	1.30	0.56	1.86	1.12	1.12	0.37	43
Basin of the Danube...	1.23	0.50	1.23	0.50	1.17	1.00	1.33	0.83	48
Scandinavia	0.73	1.09	0.73	1.09	1.09	1.45	1.09	0.73	22
Europe, Northern Zone	1.19	0.60	1.48	0.30	2.07	0.00	1.98	0.59	27
Asia, Northern Zone...	2.35	1.88	0.94	0.47	0.47	0.94	0.00	0.94	17
Both Zones united ...	1.64	1.09	1.27	0.36	0.45	0.36	1.09	0.73	44

TABLE XXVIII.—Result as to Comparative General Resultant Horizontal Direction and Intensity.

Region.	Resultant Horizontal Direction.	Intensity of Resultant.
Europe (the whole)	E. 35° 42' N.	0.61
France and Belgium	N. 71° 27' E.	0.56
Italy and Savoy	S. 85° 51' E.	2.15
Basin of the Rhone	S. 9° 44' W.	1.23
Basin of the Danube.....	W. 2° 39' N.	0.66
Scandinavia	S. 22° 30' W.	0.94
Europe, Northern Zone	S. 17° 45' W.	0.23
Asia, Northern Zone.....	N. 23° 48' E.	3.14
Both Zones united	N. 23° 55' E.	1.06
British Islands	S. 39° 5' W.	?
Spanish Peninsula.....	E. 31° 56' S.	?
Basin of the Rhine	S. 7° 9' E.	?
Turco-Hellenic Territory	N. 34° 37' W.	?
Mexico and Central America ...	N. 31° 54' W.	?
The Antilles	E. 22° 5' S.	?

There remains to be noticed, of M. Perrey's labours, his discussion of the periodicity of the earthquakes of his annual catalogues for 1844, 1845, 1846, and 1847, with reference to the phases of the moon's motions, published in 'Mém. de l'Académie des Sciences de Dijon,' 1848, 1849, part. des Sciences, p. 105, &c., and also presented to the Institute of France at a later period.

The result he arrives at, as respects these four years, is, that the number of earthquakes occurring at the Perigees (when the tides are highest and lowest) are, to those occurring at the Apogees, as 47 : 39,—a conclusion which, independently of the assumptions by which it is arrived at, must be as yet accepted with caution upon so narrow a base of induction, although possessing more than enough probability, from physical considerations, to induce further inquiry.

The Academy of Sciences (Paris) appointed a commission to report upon M. Perrey's communication; and the following translation of its report ('Comptes Rendus,' tom. xxxviii. 12 Juin, 1854) will give a tolerably clear notion of his views, which here rest upon a larger base than in his Memoirs as first published:—

"The Academy has commissioned us, MM. Liouville, Lamé, and myself, to draw up a report on a paper presented by M. Alexis Perrey, Professor in the Faculty of Sciences at Dijon, on the 21st March 1853, 'On the Connexion which may exist between the occurrence of Earthquakes and the Moon's Age,' and on a note also presented by him on the 2nd January last, 'On the occurrence of Earthquakes in connexion with the Moon's passing over the Meridian.'

"At the time of the presentation of the paper of March 1853, M. Arago had been appointed a member of the commission. The lamented death of our illustrious associate, since that date, left a vacant place in our commission; and before the presentation of the note of the 2nd January 1854, M. Lamé was appointed to it.

"M. Arago, whose attention nothing escaped which relates to the physics of the globe, pursued with sustained interest the researches of M. Alexis Perrey. The Academy has not forgotten the care which he constantly took to draw its attention to the notes which the learned Professor at Dijon addressed to him from time to time within the last few years, in consequence of the inquiries he was engaged in on the subject of earthquakes. M. Arago made particular mention, at several meetings, of the connexion which the author had already traced between the occurrence of earthquakes and the moon's age.

"The cause of the interest which belongs to this subject is easily explained. If, as is generally believed in the present day, the interior of the earth is owing to its high temperature, in a liquid or melted state, and if the globe has but a comparatively thin solid crust, the interior, being deprived of solidity, is compelled to yield, like the superficial mass of the ocean water to the attractive force exercised by the sun and moon, and it acquires a tendency to swell out in the direction of the rays of these two bodies; but this tendency meets with a resistance in the rigidity of the solid crust, which occasions shocks and fractures of the latter. The intensity of this force varies, like the tides, according to the relative position of the sun and moon and consequently according to the moon's age; and we must also observe that as the tides ebb and flow twice in the course of a lunar day, at those hours which agree with the passing of the moon over the meridian, so the direction of the attraction exercised upon a point of the interior globe must change twice a day, according as the point recedes or approaches the

meridian, the plane of which passes through the centre of the moon. Without entering into longer details, we can easily conceive that, if the fusion of the interior mass of the globe plays a part among the causes of earthquakes, then its influence may become evident by a necessary connexion, capable of observation, between the occurrence of earthquakes and the circumstances which modify the moon's action upon the entire globe, or upon a portion of it, namely, its angular distance from the sun, its real distance from the earth, and its angular distance from the meridian of the place, or, in other words, the moon's age, the time of perihelion, and the hour of the lunar day.

"These considerations, which occurred to M. A. Perrey, doubtless inspired him with the idea of the two works which we have been commissioned to examine, at the same time that they assisted in attracting the interest of M. Arago and many other learned men to the results which he obtained; but they also suggest that the essential object of the inquiries on which we are commissioned to report ought to be, to ascertain the precise date, according to the lunar day and month, of every earthquake the record of which history has preserved, and even of each of the shocks of which these earthquakes consisted. We can easily imagine the immense toil which such a research would demand, and understand that M. Alexis Perrey having already devoted several years to it without bringing it to a termination, has yet been enabled at different intervals to obtain such partial results as M. Arago deemed worthy of the encouragement and attention of the Academy; and that the learned Professor at Dijon is impatient, before encountering the labours of still more years, to learn whether the Academy approves of the course which he has hitherto pursued. The necessity the author feels for the support and direction of the Academy explains why he has, upon several occasions, submitted to it results which naturally could not be complete, and which are not entirely so even in the paper and note which we are commissioned to examine. In the paper presented on the 21st March 1853, 'On the Connexion which may exist between the occurrence of Earthquakes and the Moon's Age,' the author has devoted the first chapter to the calculation and numerical changes of the rough results of observation.

"He has supposed four possible methods of calculation. In the first, already followed in the memoir presented to the Academy May 5, 1847, the author considers as a day of an earthquake each day upon which a shock has been felt, whether in a single country, or in two or more countries at the same or at different hours, separated from each other by spaces in which the motion was not experienced. Then noting, according to the knowledge of the period, to which day of lunation each day of earthquake corresponded, he arranges all the days which belong to the first day of lunation, then all those which correspond to the second day, the third, the fourth, &c.; and he constructs a table composed of thirty lines, each line indicating the number of earthquakes which belong to the corresponding day of lunation. Now these numbers vary one day with another, and they vary nearly in accordance with the same law, both in a table comprising a total of 2735 days of earthquake, the result of researches carried on during the years from 1801 to 1845, drawn up by the author and presented to the Academy May 5th, 1847; and in a new table containing a total of 5388 days of earthquake, embracing the result of extensive researches carried on from 1801 to 1850.

"In both tables the number of earthquakes corresponding to the days close to the Syzygies, is generally a little more considerable than that which corresponds with the days close to the Quadratures. In the second method

of calculation, the author regards earthquakes experienced in different regions separated by regions where the shock is not perceptible, as distinct one from the other, and reckons as an earthquake every percussion felt in a separate region. This new method of calculation increases the number of earthquakes in the 1st table from 2735 to 3041, and in the 2nd table from 5388 to 6596. The same law is again apparent in these two new tables, and also in the four other tables which the author forms by dividing the half century between 1800 and 1850 into two intervals, each of a quarter of a century, and by successively applying the first and second method of calculation to the earthquakes of these two intervals.

"In the third method of computation, M. Alexis Perrey regards every shock of which an earthquake is composed as a distinct phenomenon, and registers it separately; but he does not possess the documents necessary for this plan because the number of shocks in each earthquake has not been accurately noted. The author has hitherto contented himself with considering in this manner the Table of 931 shocks felt in South America, chiefly in Arequipa published by M. Castelnau in the 5th volume of his 'Journey through the Central Regions of South America.' This table, without leading to results identical with those furnished by the other two methods, exhibits the fundamental relation already manifested. Lastly, in the fourth method of computation, the application of which would often be very difficult, and which has not yet been attempted by M. Alexis Perrey, we are to consider as an unique phenomenon the number of shocks consecutively felt in the same country during an interval preceded and followed in the same country by periods of tranquillity.

"To the nine tables formed by one or other of the three first methods of computation the author has added a tenth, formed by the first method. This only embraces four years, from 1841 to 1845, and contains but 46 days of earthquakes. In spite of this comparatively limited number, the proportion of the figures appears the same. In all these tables we observe a marked preponderance in the number of earthquakes which take place upon days close to the Syzygies, over those which occur at the Quadratures. However, it is but a general law which can be observed in the statement of figures of which the tables are composed; and there are numerous exceptions. In order to weaken the force of these anomalies, and more clearly to exhibit the fundamental law, M. Alexis Perrey divides the 29, 53 &c. of which the lunation is composed, into 12ths, 16ths, 8ths,—and forms by proportionate calculations applied to the ciphers of his different tables constructed on the solar days, the numbers which correspond to each fraction of lunation; he displays in all these new tables (excepting some anomalies of detail) the law of the predominance of earthquakes at the Syzygies, and thus confirms more and more his conclusion, that, for half century, earthquakes have been more frequent at the Syzygies than at the Quadratures. M. Alexis Perrey has also studied, in the more or less extensive registers which assisted him to draw up his different Tables, the question, whether there exists any connexion between the occurrence of earthquakes and the variable distance of the moon from the earth in traversing the different portions of her elliptical orbit. For this purpose he has calculated in each of his registers, and according to the different modes of computation employed to draw up the above-mentioned tables, how often earthquakes have occurred two days before and after, and upon the day of the moon's perigee and apogee; and he has shown, in the numbers thus obtained, that the total corresponding to the perigee, in which the moon is nearest the earth, is greater than that corresponding to the apogee, in which

she is at her greatest distance: then, in order to compare the results, he has taken the difference of the totals thus obtained and divided it by their sum, which has given him the quotients $\frac{1}{16.6}$, $\frac{1}{23.6}$, $\frac{1}{23.5}$, $\frac{1}{24.4}$, $\frac{1}{18.6}$, $\frac{1}{21.2}$, $\frac{1}{10.75}$, which are all greater than $\frac{1}{30}$, and the last almost equal to $\frac{1}{10}$.

“The apparent result from this is, that the difference between the unequal attraction exercised by the moon at her greatest and nearest distance has a sensible influence over the occurrence of earthquakes. In the note on the ‘occurrence of Earthquakes in connexion with the passing of the Moon over the Meridian,’ which he presented to the Academy January 2, 1854, M. Alexis Perrey discusses the question, whether the division of the shocks of earthquake during a lunar day is, like the tides, connected with the passage of the moon over the superior and inferior meridian. For this method of investigation he could only avail himself of the 824 shocks felt at Arequipa, which are registered with day and hour in the above-mentioned table of M. de Castelnau. By means of proportional calculations, which must have occupied a considerable time, he has calculated to which hour after the passage of the moon over the meridian, each of these shocks corresponds. He thus formed a 1st table (which he afterwards changed by dividing it into sixteen equal portions, grouped side by side, to form eighths) containing the 24 hours 50 minutes and a half of which a lunar day generally consists.

“By these two methods (notwithstanding some marked anomalies which could not but exist in so limited a number of facts as 824), the results obtained in both arrangements manifest the existence, in the length of a lunar day, of two periods of *maximum* for the occurrence of shocks, and two of *minimum*. The two periods of maximum occur at the hours of the passing of the moon over the superior and inferior meridians; and the periods of minimum fall about the middle of the intervals.

“M. Alexis Perrey has thus succeeded, by the simple analysis of catalogues which he had previously drawn up, in proving, by three different and independent methods, the influence which the moon possesses in the production of earthquakes:—

“1st. That earthquakes occur more frequently at the Syzygies.

“2nd. That their frequency increases at the Perigee, and diminishes at the Apogee of the moon.

“3rd. That the shocks of earthquake are more frequent when the moon is near the meridian than when she is 90 degrees away from it.

“But the numerical tables from which these three propositions are derived, present some anomalies; and the author has omitted nothing to endeavour to account for them, and to prove the law which is revealed at their first inspection. He first conceived the idea of constructing graphically the numbers contained in the tables, so as to obtain by the usual method a polygonal line analogous to those by which barometrical observations are usually represented, in which the eye catches at once the general course of phenomena in the midst of anomalies which tend to conceal it. We are tempted to regret that he has not further developed this graphical part of his work, which would have had the great advantage of displaying at a glance the direct result of his researches; and that he has not even annexed to his memoir any of the lines which he constructed. But M. Alexis Perrey considered that he would obtain still more certain results by employing calculation; and to this arduous task he devoted the 2nd Chapter of his principal paper, and the Second Part of his note of the 2nd January, 1834. It would be difficult for us to follow the author step by step in these analytical discus-

sions; we will restrict ourselves to the observation, that, in order to represent the result of his work, he has employed a formula of interpolation of this kind:—

" $\phi = M + A \sin(t + \alpha) + B \sin(2t + \beta) + C \sin(3t + \gamma) + \dots$, in which M , A , B , C , &c. are always coefficients of the same nature as ϕ ; α , β , γ , &c. are always angles, and t a variable angle dependent on the lunar motion, which will be equal to 0 degree for the new moon, to 90 degrees for the first quarter, to 180 degrees for the full moon, &c. He then adapts this formula to the numerical tables deduced from observation, and determines the particular truths which it contains. By means of the formula thus obtained, the author was enabled to draw up numerical tables corresponding to those deduced from observation alone, and in which the law of the phenomena appears disconnected from the principal anomalies which tended to obscure it in the first tables. The numbers contained in these new tables are carefully arranged, and form regular curved lines, in which the law is clearly manifest. These curves have a marked resemblance to each other, although they are not entirely alike—which could not be, for they are only approximative—and each bears the stamp of the group of figures which it represents. The resemblance of these curves is essentially increased by the fact that each presents two principal maxima corresponding to the Syzygies, and two principal minima corresponding to the Quadratures. We are thus brought back to the conclusion so evident by M. A. Perrey's toil,—that, for half a century, earthquakes have been more frequent at the Syzygies than at the Quadratures.

"The Academy fully conceives the importance of this conclusion, and appreciates the labour the author has taken to collect nearly 7000 observations on the first half of this century. This number, however, is very small for the solution of a question of this nature; and it is very desirable to have it increased, either by collecting all future observations from year to year, or by going back to past centuries, as the author has already commenced doing."

These views of Perrey have found support in the opinions enunciated by M. Zantedeschi as to the probable existence of a terrestrial as well as an oceanic tide, one in which the solid mass of the earth's crust, and the liquid or semiliquid nucleus beneath (if indeed it exist in any such state) is supposed to be an ellipsoid, with a major axis perpetually following the movements of the moon and sun. To what extent such a change of form is possible in the solid material of our planet under the constraint of the same forces that produce the oceanic tides (and whose elevations must in so far act against such change of form), it is for physical astronomy to determine. But even if its existence be admitted, and the change of level of a given point on the earth's surface were proved to amount to many feet—to far more, in fact, than the total elevation of the greatest ocean tide-wave, it is difficult to conceive how it even then could be a *direct or immediate* cause of earthquakes. Such change of form would be probably quite insignificant as compared with the earth's total mass; so that the flexures or changes of form produced by it in the solid crust would probably be far within the elastic limits of its materials, and, hence, the occurrence of fractures or dislocations due to such a train of causes impossible.

If it ultimately prove a fact that there is a real relation in epoch between earthquakes and the ocean tides, or the moon's and sun's position in respect to the earth, the phenomena will probably be found in relation, only through the intervention of changes in terrestrial temperature, or in the great circu-

lations upon or within our planet, of its electrical, or magnetic, or thermic currents, or the conversion of these into each other reciprocally, and not to the direct action of the variable attractive forces of our primary and our satellite. To some such conversions of force into heat, developed at local foci, it would appear much more probable that all volcanic phenomena are due, than to a universal ocean of incandescent and molten lava beneath our feet, with a thin crust of solid matter covering it, the present or historical existence of which is not only not proven, but for which no argument of weighty probability has been, as I conceive, advanced.

In the present state of our knowledge of the obscure relations between the internal mass and actions of our planet with the cosmical forces that act upon it both within our own atmosphere and from the abysses of space beyond, and in our comparative ignorance even of the terrestrial phenomena themselves, no speculation, however hazardous or hardy, that is based upon a natural hypothesis, need be regretted: such views in the beginning of every separate road of inductive science are eminently suggestive, and, although in themselves false, may point towards truth. It is only in this aspect that a memoir by Dr. C. F. Winslow, M.D., 'On the Causes of Tides, Earthquakes, Rising of Continents, and Variations of Magnetic Force,' requires notice. The communication appears to have been made to the Academy of Sciences of San Francisco, California, by the author, in 1854 or 1855. I have met with it only through a printed copy, for which I believe I am indebted to the author.

That our satellite *does* actually influence the magnet *directly*, has been discovered by Herr Kreil, of the Vienna Royal Observatory (see 'Phil. Trans.,' 1857, and 'Proc. Roy. Soc.,' vol. vii. pp. 67-75). General Sabine, in the introduction to vol. iii. of 'Magnetic and Meteoric Observations made at Toronto,' p. 9, states—"The decennial solar period of ten or eleven years, in connexion with the solar spots, proved to connect itself with the magnetism of the earth, but *not* with other cosmical phenomena" (see 'Phil. Trans. 1852,' Art. VIII.); that is to say, I presume, not with such cosmical phenomena as have had their laws already ascertained. Again (p. xi.), the author adds—"The solar diurnal variation appears to be wholly irreconcilable with the hypothesis which attributes the magnetic variation to thermic causation."

We find, then, that both sun and moon influence, with other and more occult forces than those that address sense and eye, our planet, and that these all incessantly modify the conditions and relations (mutual and to things on the surface) of every grain of matter in the inmost recesses of its nucleus. While every cosmical force is thus, as soon as its laws are discovered, found to be correlated to every other, all mutually convertible, and capable of disappearing and reappearing "by measure, number, and weight," as mere brute power or mechanical force, it is not too much, at least, to affirm the advancing probability, that a distinctly (though irregularly) *periodic* phenomenon, such as earthquakes, will be found intimately related to them, possibly with no very long or intricate intermediate chain of causation.

As regards the periodicity, &c., of those solar spots which admit of consideration in relation to the two paroxysmal maxima and two minima in each century (noticed hereafter), Humboldt may be referred to ('Cosmos,' vol. iii. p. 291). Schwabe of Dessau, whose works the illustrious author quotes, observed the solar spots from 1826, and, during the whole period, found three maxima (average number 300,) and two minima (average number 33,) the period being about ten years, or the tenth part of a century. Wolf of Berne ('Comptes Rendus,' vol. xxx.) considers the period of the minima as de-

finite, but that the maximum varies, being on an average five years after the minimum, and that nine minimum periods exactly make up *each* century; adding, that all the notable apparitions of solar spots on record agree with this rule. Other papers on this subject will be found, with details in the 'Ast. Nach.' and 'Pogg. Ann.,' from 1850; and in 'Silliman's Journal,' vol. xxv., some remarks of Reichenbach are worthy of attention. He observes that the period of Jupiter is 11.86 years, and that there are certain coincidences between the planet's periodic return and those of the solar spots,—adding that their conjoint magnetic effects upon our planet, in relation to the magnetic periods above referred to, cannot but be great. See also 'Gilbert's Annalen,' vols. xv. and xxi., for Ritter's memoirs on the subject; and "Hansteen on the Relations between Earthquakes and the Aurora," in 'Bull. de l'Acad. de Bruxelles,' 1854, t. xxi.

I am myself indebted to my friend Dr Robinson, Astronomer Royal, Armagh, for much of my information upon the subject, which connects itself with our own in relation to the preceding reflections, and through the singular point of coincidence as to periodic recurrences in both—the one presenting traces of being in time a submultiple of the other. But at present this must all be taken for what it is worth, *and no more*.

It may be suitable to remark here, that the movements of the inclination magnetometer as well as of the barometric column, of which several have been of late years recorded as occurring at the time of earthquakes, are most probably merely mechanical and due to the shock movements direct. This has been ascertained by Kreil at Vienna, and Padre Secchi at Rome (see also Perrey's 'Mém. Europe and Africa,' p. 11); and such appears to have been Humboldt's view (though expressed with some qualification) at the date of publication of 'Cosmos.'

The following is a translation of Zantedeschi's expressions of his own views as to the occurrence of a terrestrial, or rather *terrene tide*, probably better named, if it exist, *the elastic tide*:—

"On the Influence of the Moon upon Earthquakes, and on the Consequences probably derivable as to the Ellipsoidal Figure of the Earth and the Oscillation of the Pendulum. By M. F. Zantedeschi." *Comptes Rendus, Séance du 2 Aout, 1854.*

"I have thought for a long time that the form of the earth cannot always be the same, but that it presents an incessantly changing elliptical form, that is to say, having a continued tendency to become protuberant in the directions of the radii vectores of the two luminaries which attract it, the sun and the moon. I have always believed that a direct proof of it might be obtained by determining a point in the heavens at the epochs of the spring tides, and at that of the Quadratures. This point must appear lower at the epochs of the high tides and of the Syzygies. The Imperial Observatory of Paris, with the means that it has at its disposal, could prove if this difference be observable, and especially now, that, thanks to the labours of M. Froment, dividing has been made so exact as to admit of measuring with the greatest precision a difference of $\frac{1}{100}$ th of a millimetre between two consecutive visible horizontal lines.

"I have always assumed that a compensation pendulum of such a length that it exactly beats seconds at the epoch of the quadratures and of the neap tides, must beat more slowly at the epoch of the spring tides, from the transit of the moon over the meridian of the given place, and at the epoch of the syzygies; and, taking from this fact that the variations of the force of attraction upon the mass of the earth are continuous, I have concluded from it the necessity for astronomy to take account of these times; and

herein I find the explanation of certain leaps of astronomical clocks of which the learned have not hitherto been able to discern the cause. I believe that one day we shall have the equation of time in functions of the variations of intensity of the planetary attractions, and of the regular oscillatory movements of the earth, as we now have the equation of time in functions of the motions of translation and of rotation of the earth itself. I say the *regular* oscillatory motions, because, as for the irregular movements, we cannot submit them to rule, and we are enabled to account only for the extraordinary concomitant phenomena presented by the atmosphere, by the earth, and by certain species of animals. The irregular motions which we call earthquakes, happen more frequently, it has been observed, either at the epoch of the Syzygies rather than at the epoch of the Quadratures, or oftener at the epoch of spring tides than at that of the neaps. This important observation is found in the works of Georges Baglivi and Joseph Toaldo.

The first, in his '*Storia Romani Terræ Motus, anni 1703*,' says, "*In singulis lunæ aspectibus, seu quadraturis, potissimum in plenitudine ejusdem seu totali oppositione cum sole, certo succedebant terræ motus, frequenter paululum præcedebant ipsos aspectus.*"—Georgii Baglivi Opera Omnia, Bassani, 1737, p. 415, Editionis Venetiarum, 1752, p. 326.

Toaldo, speaking generally of earthquakes, says, "the late M. Bouguer in the account of his voyage to Peru speaks much of earthquakes, so frequent in that country. He mentions with doubt the assertion of a Peruvian 'savant,' that earthquakes have certain fatal and marked lines when they occur at low water. On the other hand, Chauvalon, in his voyage to Martinique, notes particularly the earthquakes which took place at the time of high water; and the earthquake which destroyed Lima on the 28th of October, 1746, occurred at three o'clock in the morning, at the instant of high water (*ora della prima acqua*). Thus we remark in other countries that these phenomena may themselves depend on the cosmical causes of the action of the sun, and especially of the moon." (Giuseppe Toaldo, '*Della Vera Influenza degli Astri, etc., Saggio Meteorologico*,' Padova, 1770, p. 190.) I hope that the Academy of Sciences will well receive these documents and these ideas, which tend to augment the merit and the value of the very important studies of M. Perrey.

Edmonds, also, has endeavoured to show that many formidable earthquakes are found to have occurred the day after the moon is in her first quarter ('*Journ. Polytec. Soc. Cornwall*,' Note 158; Sabine's '*Cosmos*').

Before dismissing the subject of other earthquake catalogues, the following labour as to Indian earthquakes should be noticed. In the '*Journal of the Royal Asiatic Society*,' vol. xii. n. s., for 1843, Lieut. R. Baird Smith, B.E., made one of the most extensive contributions to our slender stock of oriental earthquake annals. He divides India into nine earthquake tracts, partly on physical grounds, partly arbitrarily, viz.—

1. Central Himalaya;
2. Lateral Himalaya, including—
 - a. Cabul,
 - b. Jellallabad,
 - c. Cashmere,
 - d. Nepaul,
 - e. Assam;
3. The Solymaun Mountains,
4. The Aravulli Mountains,

5. Delta of the Indus,
6. The Vindhya Mountains,
7. Delta of the Ganges,
8. East Coast Bay of Bengal,
9. Eastern Ghats;

and under these divisions describes more or less fully a total number 162 earthquakes, which he finally tabulates, by date and place only. The epoch of his catalogue commences nominally at A.D. 1505; but almost the whole of the catalogue refers to the 19th century, and comes down to the year 1842.

After his remarks upon the earthquakes of the first region (p. 1039) he observes, "The hot springs, I believe, owe their high temperature to internal chemical action extensively distributed; and the earthquakes are to the convulsive efforts of the elastic matter generated by this action, escaping from the interior of the earth." . . . "To define the nature of the action, while ignorant of the chemical nature of the springs, would be vain;" . . . but . . . "I cannot resist the conviction that both are due to one and the same origin;" . . . "There are no active volcanic vents yet discovered in the Himalayas, but abundant hot springs and trap dykes, are evidences of disruptive action."

In the same vol. p. 741, a translation, by A. Sprenger, of the Arab MS. in the Imperial Library at Paris, of a work of As. Soyuti on earthquakes, is given. The original work is entitled, 'Kashf as salsalah was az Zalzalah,' i.e. "a clearing up of the history of earthquakes." It contains a catalogue of about 120 earthquakes in Western India, Persia and Caubul, and extending to Arabia, Syria, and Egypt. It certainly, however, scarcely warrants its title, and contains few facts of scientific value.

Again (p. 907), a small catalogue of earthquakes in Upper Aresam occurs—the authors, Capt. Hannay and Rev. N. Brown. The chief statement of importance to be found in it is their opinion, that in this region the horizontal direction of shock seems to be mainly from S.W. to N.E.

Since the publication of former 'Reports,' some monographs of single earthquakes have appeared; but reference is here only to catalogues.

While these sheets have been passing through the press, the work of Dr. Otto Wolger, with catalogues of the Swiss earthquakes, has appeared, and demands notice for the extreme accuracy and care with which the volume has been produced.—'Untersuchungen über das Phänomen der Erdbeben in der Schweiz,' von Dr. G. H. Otto Wolger, Gotha 1857, 1858, 3 vols. 8v. The first, "Chronik der Erdbeben in der Schweiz," also embraces a discussion as to the periodicity, locality, and extent (Ausdehnung) of the Swiss earthquakes, with the results graphically reproduced.

The second contains the geology of the Canton of Wallis, in which great a number of rapidly recurrent feeble shocks have been so long recorded.

The third, 'Geschichte der Erdbeben (im Wallis) des meteorologischen Jahres 1855,' together with a chronicle of those in the Swiss Cantons and adjacent parts of France.

There is an excellent though small map of the Canton of Wallis, showing the points of observation of the many small shocks that have become identified with the name of Pignérol as a centre—and in several instances showing the horizontal directions observed—which quite bear out the observations be found further on, as to the effects of surface in perturbing the general emergent direction of the wave of shock.

The work of Dr. Wolger is entitled to the study of physical geologists

Perhaps, like most men who carefully and lovingly perfect their subject, he attaches a too preponderant value to the limited district of which he treats.

Having so far considered the labours of others as to the distribution of earthquakes in time, some remarks remain to be made on their distribution in space by foreign authors. The seismic map of Berghaus in his 'Physical Atlas,' is the most important attempt of this sort emanating from abroad. The following are Perrey's remarks upon this map ('Mém. de l'Académie des Sciences de Dijon,' t. iv. année 1855, p. 57):—

"M. Berghaus, of Berlin, has devoted map No. 7 of the geological part of his beautiful Physical Atlas to volcanic and seismic manifestations. Greenland is very slightly coloured, and is included in the circumference of a circle of percussions, the centre of which is in Iceland. This statement does not appear to me to be at all supported by facts. The author appears to have outstripped observation; for the commotions in Iceland constitute an almost local phenomenon; rarely ever is the island simultaneously shaken in its entire extent, and the shocks are only of moderate intensity."

It may be added, that observation points out that the connexion as to earthquake commotion is between Iceland and Norway, and not between Iceland and Greenland. Of the latter country, however, in this respect we know but little.

As to Greenland, I do not know whether any earthquake has occurred there but that of November, 1755. That was violently felt; it caused a terror so much the greater, as shocks of this nature were completely unknown. However, it is probable that they are occasionally felt.

The 22nd of September, 1757, there was a violent hurricane, the wind from the south, accompanied by hail and rain; the lightning was terrific, but without thunder. It was generally believed that a shock of earthquake was felt. (Prévost, 'Hist. Gén. des Voy.' t. ix. pp. 23 & 209.) Earthquakes, the author adds, are rare in this country.

Two years after, in September, 1759, at New Herrnhut (Greenland), the house of Siehlfels experienced shocks like an earthquake, although it was very low and had walls four feet thick. The houses around suffered severely: the roofs were split; and the boats drawn up on shore were carried away by the hurricane, which was felt at a distance. This storm was preceded and followed by igneous meteors, one of which set fire to the house. On Christmas Eve a similar phenomenon occurred at noon. (Prévost, *l.c.* t. xix. p. 208.)

These are the only facts that I can quote relative to this country, which, I repeat, notwithstanding its contiguity to Iceland, ought not, in my opinion, to be placed within the sphere of the volcanic and seismic action of that island.

M. Berghaus has marked the Azores and Canaries with a darker shade; and this memoir will contribute to confirm the author's idea of also colouring the Archipelago of Cape Verd and the Antilles. But it leaves all the rest of the basin uncoloured; and surely it is difficult not to admit some shading, however slight, in latitudes distinguished of late by M. Daussy. Let us again repeat, that earthquakes, which ought to form an important part in the study of terrestrial physics and physical geography, have hitherto been too much neglected. They have been resigned to geology, to which, in my opinion, they only indirectly belong.

But to continue. Algeria bears, on M. Berghaus's map, a very dark shade, which the note I published in our last 'Memoirs' does not justify. Yet the

illustrious physicist whom I have just quoted includes the Azores and Canaries in the seismic region of the Mediterranean.

They would seem to form the western part of an axis which extends to Hindostan with variable shades, and thus unites the Atlantic with the great volcanic chain of the Sonde (Sunda), which, as we know, is connected by the Japanese and Kurile Islands with the Aleutian Archipelago, and by this chain to the grand volcanic range of the two Americas. This idea is ingenious, but is it true? It is a point that I cannot at present discuss. Yet we must admit that the Azores, and even the Canaries, seem to form a part of the sphere of subterranean convulsions, the centre of which is almost parallel to Lisbon; and to be at the western extremity of that great seismic zone which proceeds by the peninsulas of Spain, Italy, and Greece, to the volcanoes of Asia Minor, and which there joins the central chain of Asia. It is, in fact, within this zone, extending towards the north as far as the Carpathian Mountains, that the principal centres of earthquakes and the most remarkable seismic axes in Europe are to be found. Extending to the west along the 40th parallel, this zone reaches the United States of America, where it embraces New York and Boston, which M. Berghaus has perhaps marked with a rather too dark colour, though earthquakes are not rare there; and thence it proceeds to Kentucky, Tennessee, and Missouri, where the phenomena of the year 1811 demand a darker shade in M. Berghaus's beautiful map. M. Berghaus draws a linear region in Arabia, from Medina to Yemen, along the east coast of the Red Sea. Can this be a partial axis of convulsion? Is it independent of the Mediterranean zone? Or is it united to it by a second axis—the Syrian axis, parallel to the east coast of the Mediterranean? But the countries near to the Isthmus of Suez appear little subject to earthquakes; can there be a solution of continuity between these two axes? or does the space which divides them, and where the phenomenon has, so far, been so rarely remarked, constantly present a peculiarity verified more than once in America? In the New World (at Caraccas, for example) certain regions of small extent have been observed to enjoy a complete calm while the neighbouring country experienced frightful catastrophes.

The historians of these disasters have characterized this unconquered part of the soil by a picturesque expression, namely, "a bridge has been formed." The probable physical explanation of this phenomenon of "the bridge" has been given in a former Report (2nd Report, p. 309), by the author of this, based upon the view that *total reflection* of elastic impulses may occur under certain suitable conditions.

Perrey continues, "No simultaneous convulsions at both extremities of this Syro-Arabic linear region have been recorded. However, if we recall that the Himalaya Mountains are very subject to subterranean convulsions; that the Alps, and especially the Pyrenees, are frequently shaken, the Caucasus-range still oftener, and that the Andes are almost always in a state of commotion; must we not regret that we possess no information concerning the phenomena in the high Ethiopian chain? is it not to be desired that travellers in Africa should make observations upon a matter so interesting to science?"

"During the last few years Abyssinia (strongly marked in M. Berghaus's map) has been the study of numerous French explorers. Several narratives of their vast and useful labours have appeared; but I do not find one word about earthquakes! The Academy of Sciences has just given new instructions to M. Rochet (d'Héricourt), about to undertake a third expedition to that country; and the phenomenon is not even mentioned by M. Duperrey!

Quite recently, again, I felt the same painful surprise at reading the instructions given to M. Raffenel.

“Does Abyssinia form an axis of convulsion perpendicular to the Arabic axis? or is it the eastern extremity of an unique axis formed by the great Ethiopic chain, and crossing the African continent at its greatest breadth?”

“In nearly the same latitude as Abyssinia, but on the western coast of Africa, we find the sources of the Senegal and Gambia vividly coloured in M. Berghaus’s map. What evidence has the author for this statement? With respect to this region, I am only acquainted with the two following descriptions drawn from M. Walcknaër’s collection.” We read, at t. vi. p. 181, “The aspect of the mountains Nikolo and Bandeia prove that this country has been the theatre of volcanic eruptions. Earthquakes are very frequent; and shortly before M. Molliou’s visit, one of the most violent had occurred, the shocks of which had been felt as far as Timbo.” And further on, p. 184, “The mountains, covered with ferruginous stones and cinders, which enclose the valley in which are the sources of the Senegal and Gambia, lead M. Molliou to believe that they occupy the crater of an extinct volcano. This traveller was at the source of the Gambia, April 8, 1818.”

It is useful to compare this passage with the following, extracted from the same collection, t. xii. p. 356:—“There is no record in Senegal that any portion of the colony has ever experienced an earthquake.”

Without seeking to justify the accuracy of M. Berghaus, it may not be uninteresting to remark that the Antilles and the Republic of Guatemala lie under the same parallel of latitude (about 15° N.) as Abyssinia and the sources of the Gambia.

Can there be an axis, or rather an immense zone, of convulsions parallel to the Equator? Often convulsed in the western counterforts (the Archipelagos of Cape Verd and the Canaries), Africa suffers also in the S.E., in the great southern chain of Madagascar. I find in M. Seguérel de la Combe that “earthquakes are very frequent in Madagascar. When they occur, the natives leave their houses and commence beating the walls with their hands. They do not allege any reason for this conduct but custom.” (‘Voy. à Madagascar et aux Iles Comorres,’ t. i. p. 3.)

Let me add this remark from an ancient traveller in Madagascar: “Happily earthquakes are here completely unknown.” (Le Gentil, ‘Voy. dans les Mers de l’Inde,’ t. ii. p. 367.)

If we subjoin to these contradictory statements the few facts which we possess, we shall justify M. Berghaus’s not having coloured the south of Africa.

“1786, August 4, 6.35 A.M., in the Isle of France, two violent but harmless shocks. The motion was horizontal and vertical. The barometer was not affected. Earthquakes are of rare occurrence. The volcano in Bourbon, active from the 5th of June previous, emitted much lava upon this day, but the island was not sensible of any shocks.” (Péron, ‘Voy. aux Terres Australes,’ 2nd edit. t. i. p. 134; ‘Ephémér. de Manheim,’ 1788, p. 397.)

1809, 8th of January, the island of Penguin, close to the Cape of Good Hope, was swallowed up by an earthquake. I am unacquainted with this island, and I only find this circumstance related in an anonymous work entitled ‘Mémorial de Chronologie,’ t. ii. p. 932.

Here, again, relative to another earthquake of the same year, 1809, are the details communicated by M. Barchers, Minister of Stellenbosch (country of the Hottentots), to Campbell (end of November 1812), concerning the first of the earthquakes which occurred three years previously:—

“The church of Paarl was then vacant. The governor begged me to preach

there once a month. On Saturday, the eve of the day on which I had to go there, I felt extremely ill and dejected. On Sunday morning my wife and I set out. When I reached Paarl, I was very weak, and asked for some water; but it was lukewarm, and I could not drink it. I was told it had been brought from the fountain. I sent my slave, but what he brought was hot. I went thither myself, and found it was really the case. We could not imagine the reason. Whilst I was preaching, I felt so giddy that I scarcely knew what I was saying.

"After the sermon, I spoke of this sensation to several of my friends, who declared that they also experienced it. We returned to Stellenbosch on the following morning. The whole of that day my family and servants and myself felt very unwell; the dogs also shared in our uneasiness.

"At 10 o'clock we were all alarmed by a noise like that caused by numerous carts rolling through streets. We did not know what it was; but all my family were terrified. A great light shone into the room. Supposing that a thunder-bolt had burst, I exhorted them not to be alarmed, as the lightning had passed, and the danger was gone. Whilst I was speaking, the same noise which we had just heard was again repeated, and we all trembled. 'Oh!' cried I, 'tis an earthquake; let us all go into the garden.' We felt, to use a Scriptural expression, that 'there was no more life in us.' A third shock followed; it was less violent than the first two. The noise was dreadful, not only owing to its loudness, but also to its nature. I can only describe it as a sort of groaning, or piteous howling. The dogs and birds testified their fear by their cries. The night was calm, not a breath of wind stirred the air; but I remarked a number of luminous meteors. I observed small clouds in various quarters, but their aspect presented nothing new. Every one endeavoured to keep close to me; alarm was excessive; I said what I could to allay it. At last we ventured to return to the house, and endeavoured to sleep to recover ourselves; but the effort was vain." (Walckenaër, 'Collect. des Relat. de Voy. en Afrique,' t. xviii. p. 275.)

1810, in the depth of winter an earthquake occurred at the Cape of Good Hope.

1811, 2nd June, five minutes before 12 o'clock noon, another earthquake took place. The heat was greater than usual at this season, the thermometer was 16°·8 R. A thick mist filled the atmosphere, yet did not obscure the sun's rays; not the least breeze disturbed the air. The inhabitants, who greatly dread subterraneous shocks, were reminded by these symptoms of the earthquake of the preceding year. M. Burchell was busy indoors with preparations for a missionary journey, when suddenly a noise like an explosion shook the entire house. Three or four seconds afterwards a second peal like thunder produced another shock; at the same instant a singular motion and vacillation in the atmosphere was apparent, whilst the sky continued perfectly serene. M. Burchell ran out to discover what had occurred; he saw all the inhabitants running out of their houses in great alarm, pale and trembling, not conscious what they were doing, the women either screaming with terror, or motionless and incapable of speech. After the second shock, the trembling of the atmosphere had ceased, and the temperature a little cooled. The people gradually regained their composure, observing that no more shocks followed. Many houses were injured, and walls split.

This earthquake took place five minutes before noon, during the Cape winter; the preceding year it occurred during the night, in the height of summer: so this phenomenon is not limited to any time of day or year.

M. Burchell saw the trace of electricity in all the preceding symptoms, and can only explain the earthquake as an explosion of electric matter.

On the morning of the 19th another shock was felt, but unaccompanied by explosion or other consequences. A slight sound was heard, which appeared to travel from N. to S., and lasted about three seconds. (Walckenaër, *loc. cit.* t. xx. p. 20-22.)

To these facts we may subjoin the following:—

1811, 7th June, at the Cape of Good Hope a violent shock of five minutes; the houses tottered, and even the vessels in the bay felt the shock. (J. D. 14th Nov.; M. U. 15th Nov. 1811.)

1818, on the night between the 28th Feb. and 1st March, in the Isle of France, a hurricane similar to that of 1716; it is alleged that shocks of earthquake were felt. (J. D. 21st June 1818.)

1821, 9th March, in the Island of Bourbon a slight shock. The eruption of the volcano, which had commenced on the 28th February, still continued. (C. P. t. xxxiii. p. 404; Garnier, *Météor.* p. 124.)

1840, 7th July, in the Isle of Bourbon, earthquakes recorded without detail by M. Meister in the *Annalen für Meteor- und Erdmag.*, 1er cahier, p. 161.

1844, 21st Feb., 8 P.M., in Isle of Bourbon, shocks and terrible wind (communic. de M. Meister.)

If we add to these five or six earthquakes the eruptions of the volcano in the Island of Bourbon in 1708, -51, -66, -74, -86, -87, -91, -93, and 1800, we shall have all the manifestations which I can quote of the interior activity of the globe in the south of the African continent. So this part of Africa appears little subject to subterranean commotions. But is it the same with the interior of the country? It would be very interesting to learn this.

Johnston, in his *Seismic Map* (Phys. Atlas, No. 7, Geol.), lightly tints the southern extremity of Africa, left untouched by Berghaus.

To these remarks of Perrey may be added, that both Berghaus's and Johnston's seismic maps alike labour under two most important defects.

First, a hard and rigid line, often of an extremely irregular figure, limits strictly and definitely the supposed boundary of seismic commotion in each assigned region. Two physical misconceptions are involved in this: first, that forces emanating from a centre, of the nature of earthquake shocks, can have any definite boundary; secondly, that a line drawn upon the earth's surface around any centre of impulse, and through a number of points at which the horizontal elements of shock are alike (suppose those at which these elements become insensible without the help of instruments, which would be the boundary line in a popular sense), can possibly have, when embracing large areas, a highly irregular though closed curvilinear figure. The curve traced through such a line of points must circumscribe a space either nearly circular or slightly elliptic; all irregularities due to variation of surface vanish over such vast spaces.

Irregular curved areas are alone possible on the assumption of more than one impulse propagated from the same origin simultaneously, of which we have as yet no evidence.

The second defect common to both those maps, and possibly difficult to be avoided from their small scale, is the absence of any positive and invariable, though conventional principle of application of the *depth of tint* in colouring, which shall determine, by its depth, the intensity and frequency of seismic action at given centres.

The principles adopted with the seismic map attached to this report will be explained further on.

Berghaus's maps (3 Abtheil. Geol. No. 7 und No. 9) give an exceedingly imperfect notion of the whole east of China, and indeed of the Sunda

and Philippine Island groups, including Luzon, incomparably the most important and interesting earthquake region on the face of the earth. Berg-haus's maps, 3 Abtheil. Geol. No. 8 und 10, "Specialia vom Vulkan Gürtel," &c., are worthy of all commendation, save as respects the outline of seismic regions already adverted to, and here repeated even in a more distorted form.

Such have been the results of previous labours as to the distribution in time and space of earthquakes. I proceed to those deduced from our own researches.

At the conclusion of the Second Report (1851), the principles upon which the British Association Earthquake Catalogue itself was compiled have been described; it remains now to describe the methods by which it has been discussed, and to state the results.

The collection of an earthquake catalogue is a work essentially of a statistical character, and partakes of all that disadvantage and incompleteness that belongs to the collection of facts not the result of choice and experiment, but presented to us, through various and imperfect observations, from many places and through long-lapsed periods, during which all the conditions of observation have suffered much change, so that the facts that are presented for record, and those of which no account is given, are alike subject to certain contingent or accidental modifying conditions, but of such a nature as to defy our making them part of our discussion.

So in a work which proposes to collect under one view the transmitted observations of the whole human race, and of all historic time on this particular subject, the conditions of human observation itself enter into the results, and our earthquake record is at once an account of these phenomena, and of the rise, progress, and extension of human knowledge and observational energy, and also of the multiplication and migrations of the human family and its progress in maritime power; in a word, at every moment the indeterminate extent to which man has fulfilled his great destiny of "replenishing the earth and subduing it," affects every continuous record of his observations or his arts.

The method of discussion followed was that of numerical analysis as to time, and topical analysis as to space, from which curves graphically representing the results have been projected by the usual methods.

One conventional arrangement has been found inevitable. It refers to the cases of long-continued slight shocks or tremors, occurring almost daily, as at Pignerol in 1808; St. Jean de Maurienne in 1839; Comrie, in Perthshire, 1839-1847; and Ragusa in 1843-1850. In these the slight shocks recorded for each month of the disturbed period are grouped as forming one earthquake at the locality. Had not some such arbitrary rule been adopted, these comparatively insignificant, though frequently repeated exhibitions of seismic force (if they be such) would, when introduced in the curves, have given, at certain points of time, a false elevation to the abscissæ, while the phenomena themselves are not of a character materially to modify our results even if excluded.

The conclusions possible from the still vast mass of facts here brought together, however, will, as a first generalization, be found, I apprehend, not unimportant.

They may be classed under two great heads; viz. the relation of seismic energy to time and to space, or the distribution of recorded earthquakes in each. And, first,—

Of Seismic Energy in relation to Time.

Plates I. II. III. IV. V. and VI. carry down the stream of time the whole series of observations from 2000 years before the Christian era to the year 1850.

In all these chrono-seismic curves the ordinate is that of *epoch*, and must not be confounded with one expressing in anywise the duration of each shock or separate seismic effort. The abscissa is that of seismic intensity, which has been assumed proportional to the number of coincident seismic efforts, without taking any account in the curve of the variable intensity of different efforts. This is a source of uncertainty that would not have been avoided, but rather the tendency to error increased, by any conventional law of enlargement of the abscissa that could have been devised to suit the vague proportion of greater or less in earthquake narrations; but the means are given to the reader of applying such corrective as the information admits, by placing along the line of time down to the year 1750 the letter G above each epoch at which an earthquake of undoubtedly great and destructive intensity has been recorded, and the letter S above all those that were so circumstanced as to have been followed by the influx of "great sea waves." This notation might have been carried on further, but that after the year 1750, when observations rapidly multiply, the number of earthquakes recorded as being "great" are so numerous, that to distinguish their epochs thus would have involved the extension of the ordinate to a new and inconveniently enlarged scale. For the first three centuries of historic time (according to our commonly accepted chronology) it will be seen that there are no earthquake records, and that, while between A.C. 1700 and A.C. 1400 there are a few scattered facts, there is again from A.C. 1400 to A.C. 900, nearly a period of five hundred years of perfect blank, followed again (with a few exceptions) by another blank from A.C. 800 to A.C. 600. Even in the succeeding century, but two earthquakes are recorded; so that, in fact, the record of any value for scientific analysis may be said to commence at the five hundredth year before the Christian era.

It is only in the first century prior to our era that the curve shows that observations may be at length deemed even continuous, every previous century being interrupted by lengthened lacunæ.

From the commencement of the Christian era downwards to the present day, the abscissæ continually increase in closeness and magnitude, and at the first casual glance suggest the idea that earthquake energy has increased over the whole earth during the course of ages in a fearful manner. We shall see, however, reason to correct any such conclusion.

Although periods of thirty and forty years occur in the second and third centuries of our era without the record of a single earthquake, it did not seem advisable to affirm as certain the want of all observation, by the substitution here of lacunæ for the continuity of the curve.

The end of the third century first gives evidence of numerical increase; and the increase thence is steadily progressive up to the year 1850.

It is not, however, until the seventeenth century that the increased number of earthquakes becomes strikingly remarkable, increasing still more in the eighteenth, and presenting a far greater number in the first half of the nineteenth than in both the preceding centuries taken together.

Yet this vast and rapid expansion, in the three last centuries especially, affords no proof whatever that there has been a corresponding, or even any increase in the frequency of earthquake phenomena. Our chrono-seismic curve is, in fact, not only a record of earthquakes, but a record of the ad-

vance of human enterprise, travel, and observation. The epochs of printing and the Reformation are those of the first great expansion, while the discovery of the new world, the voyage to India round the Cape, and the vast accessions of European colonization and commerce of the last 150 years, connect themselves as causes with the two latest curves. We have traced at once the history of a physical law and that of human progress. How far, then, is it possible to disentangle these elements, so as to arrive at a conclusion as to whether seismic energy over the world is progressive, constant, or retrogressive? To do so perfectly is perhaps impossible; the elements by which the rate of observational knowledge has been determined are too complex and too imperfectly known to render any attempt to fix its rate of expansion in time probable. Even the area of observation itself, the land and water known to history at given epochs, can be but vaguely sketched; as vaguely also the number of observers, and the determination of the human mind towards observation. (See Appendix I.)

This much is certain, however;—that up to, and even beyond the Christian era, no record of earthquakes exists for any portions of the earth's surface, except for limited areas of Europe and Asia, and a still more restricted patch of Northern Africa, and, if Kaempfer is to be credited, for Japan, of which, however, we know nothing for certain. Yet, of the enormously larger areas of the then outer and unknown world since discovered, it is not to be supposed but that there was a proportionate (perhaps even for the "New World" a more than proportionate) amount of earthquake energy, though not recorded or even known to mankind.

If, however, the curve of total energy (Plate VII.), in which the facts of all the preceding are condensed into a single line, be examined and compared by a broad glance with the great outlines of human progress, the conclusion appears sufficiently warranted, that during all historic time the amount of seismic energy over the observed portions of our world must have been nearly constant. To assume that earthquake disturbance has been continually on the *increase*, would be to contradict all the analogies of the physics of our globe. These analogies might lead us to suppose that, like other violent presumed periodical actions, they were getting spent, and that the series of earthquake shocks would be found a converging one. Were this so, however, to any considerable extent, we should not find the vast expansions of results which the last 300 years present; or, although the expansion might be absolutely large, its divergence would not present such decisive features of progressive increase. The results due to the number of observers would be more or less balanced by the increasing paucity of events to observe and record; but this appears conclusively to lead to the deduction we have made, namely, that if the curve of total energy be closely examined century by century, it will be found that, at periods of social torpor and stagnation of observational energy (and this is so even far down the stream of time), the number of earthquakes remains nearly constant, or with a very slight but nearly uniform increase. Thus, from the eleventh to the beginning of the fifteenth century, the abscissæ are almost equal, the crests of the curves being nearly all ascribable to single great earthquakes, which made themselves felt over vast areas. Their expansion just keeps pace, so far as can be judged, with that of contemporaneous human progress; but if the series was really a distinctly converging one, at such periods we should find the abscissæ decreasing also. On the other hand, we find the increase in the number of recorded earthquakes always coinciding with the epochs of increased impulse and energy in the march of the human mind.

We therefore conclude that our evidence, such as it is, indicates a general

uniformity in the occurrence of earthquakes as distributed over long epochs of time. Setting aside (as contradicted by all other sources of analogy and information) the supposition that this, or any other phenomenon of occasional disturbance, has an increasing development upon our planet, we have two remaining alternatives;—either that seismic energy is getting gradually spent and is dying out—this, the evidence before us appears sufficiently to contradict; or that, upon the whole, during our short and most imperfect acquaintance with it, it has remained pretty uniform throughout historic time, taking one long period with another. Yet, could we extend our view beyond the short limit of man's history to the vast past duration of that of our globe itself, it might be found that seismic energy is really a slowly decreasing force.

A conclusion thus appearing at the first glance even contradictory to the presented results from which it is drawn, may bear a certain boldness of aspect, for which I hope to find that the observations preceding, as to the true character of all earthquake records, and of the sort and amount of stress that may be laid upon them, will be held a justification.

But while such uniformity or insensibly slow decadence may be the fact through time taken as a whole, there is also evidence of irregular and paroxysmal energy in reference to shorter periods; that is to say, not only (as all know) do earthquakes occur at some times, and not at others, in any given spot; but, taking the whole area of observation together (in which there is no moment, perhaps, or but a very brief one, wherein there is not an earthquake somewhere, or more than one), it will be found that there are epochs when they occur in greater numbers or intensity, either in the same or in several places within a limited time,—i.e. periods of paroxysmal energy.

If we omit from our view all the curves of earlier periods and less ample observation, and limit our consideration to those of the last three centuries and a half, i.e. from A.D. 1500 to 1850, this paroxysmal character becomes evident at a glance, and increasingly so in the last century and a half (the epoch of all human history the most replete with discovery), wherein the number of recorded observations is so great, that it was necessary for clearness to double the scale, of the ordinate of the diagram (Plate VI.) in relation to the preceding ones. On examining these curves, they seem to justify the following deductions:—

1. While the smallest or minimum paroxysmal interval may be a year or two, the average interval is from five to ten years of comparative repose.
2. The shorter intervals are in connexion with periods of fewer earthquakes—not *always* with those of least intensity, but usually so.
3. The alternations of paroxysm and of repose appear to follow *no absolute law deducible from these curves*.
4. Two marked periods of extreme paroxysm are observable in each century—one greater than the other—that of greatest number and intensity occurring about the middle of each century, the other towards the end of each.

This is one of the most remarkable facts that these curves seem to point to: from about the fiftieth to the sixtieth year of each century, both the number and intensity of earthquakes will be observed suddenly to shoot up; again, during the last quarter of the three complete centuries another but less powerful paroxysm is apparent. The paroxysmal power at these two epochs in each century far exceeds any other paroxysms within their limits.

Within the first period (in the 18th century) we find the great Lisbon earthquake; within the second, in the same century, the great Calabrian one. We find (referring to the Catalogue itself) earthquakes in great numbers, and many great ones—in the Mediterranean basin in the middle of the 17th century, and the great Jamaica earthquake in its latter decade; and in the 16th century, its middle period was marked by great earthquakes in China and in Europe, and the latter period by numerous shocks, and most of them severe, as at the Azores, &c. Whether the latter half of our century shall show the like, remains to be seen; from its commencement, however, it presents no paroxysmal period comparable to that between 1840 and 1850.

While this general resemblance of the curves of these latter centuries admits of no doubt, I would forbear from founding anything thereupon beyond this:—that within this time there seems to elapse a period of about a century between each of the *very greatest* paroxysms (number and intensity together) of earthquakes, and a like period between two other consecutive paroxysms, of which the second is the next greatest observable, although far below the first in power; that a period of thirty to forty years seems to occur between the first and very greatest paroxysm, and that next in power below it; and that in the middle period (especially in the 17th and 18th centuries) the number of earthquakes is greatest that crowd into a very brief time (four or five years), while at the latter period the number is thickly spread over ten or twelve years.

Upon the whole, the forms of the curves appear to indicate a comparatively sudden burst of seismic energy at each great paroxysm, and (by their flat tops or more sloping lines to the right hand) a more gradual subsidence, as if the train of causes required time to regain, after one spent paroxysm, their energy and regimen, which, when restored, were suddenly put into action, and which, once developed, were slow in being wholly expended and relapsing into repose.

The occurrence of such epochs at the middle, or towards the end of our purely arbitrary subdivision of duration into centuries, must be of course only accident. The interval of *duration between* one epoch and the next, is that alone which can have a cosmical basis.

We may then provisionally affirm the probability of two periods of earthquake maxima—a greater and a less alternately—as occurring in a hundred years, for the last three centuries of history at least. The existence of *some* periodic maxima in remoter centuries can hardly be doubted, although the epochs of the two maxima have a secular movement, and do not fall in the same place in the older times. Anterior to the 16th century, however, the general curves of time (Plates I. II. and III.) are, through paucity of observations, not sufficiently “pronounced” to enable this to be ascertained from them, or to warrant the graphic representation of the epochs of occurrence of such paroxysmal periodic maxima for the whole even of the Christian era.

In Plate VII. fig. 2, the periods of paroxysm (number and intensity) are summed and grouped for each successive century of our era. The 1st, 5th, 9th, 12th, and 18th centuries are those of greatest seismic development, while the 1st and 2nd centuries A.C., and the 3rd, 7th, 10th, and 14th centuries of our era, are times of comparative repose. The numerical value of the paroxysmal centuries (as we may term them) increases, though not regularly, as the present time is neared, and is modified, without doubt, by the same conditions of observation that affect the expansions of the later curves of time. We dare not base any generalization upon it.

Numerically, we find the following average ratios of earthquakes for the

successive historic groups, of time extending over the whole record of the catalogue :—

TABLE XXIX.

Historic Group.	Ratio per Month.	Ratio per Year.
2000 to 1000 B.C.	0·00033	0·004
1001 B.C. to Christian era ...	0·0045	0·054
A.D. 1 to A.D. 1000	0·0185	0·222
A.D. 1001 to A.D. 1850	0·545	7·740
A.D. 1551 to A.D. 1850.....	1·450	17·370
A.D. 1701 to A.D. 1850.....	2·610	35·310

These numbers are absolute as well as proportional ; nothing can more distinctly show the relation between the expanding areas of our curves of time and the increase of observation.

Sir Charles Lyell, at p. 428 (‘ Principles of Geology,’ 7th edit.), calculates, upon approximate data, the average number of actual eruptions of volcanic matter at 2000 per century, or 20 per annum,—a result which harmonizes sufficiently with the preceding, and gives support to the commonly received view of the connected nature of volcanic and seismic phenomena.

This connexion receives further confirmation from the facts recorded by Perrey (‘ Mem. on Chili,’ p. 201), as to the long duration there, of many earthquakes of a character much more violent and decisive than the tremors long continued, at Comrie, East Haddam, &c. He mentions earthquakes in 1647, 1730, 1751, 1819, 1822, and 1833, each of which lasted, with little intermission, for several months, and which, from other sources of information, seem to have been in some instances contemporaneous with prolonged activity of the neighbouring volcanic regions.

Of Seismic Energy in relation to Season.

I now proceed to such discussions as the data will admit, of the relations between seismic development and the time of year. In Plate VIII. are given the curves of mensual seismic energy obtained from the entire period of the catalogue, thirty-two centuries.

The northern and southern hemispheres of observations have been separated for the following reasons. The total number and value of the observations in each, present great disparity between them respectively. We are enabled graphically to present 5879 observational results for the northern, and but 223 for the southern hemispheres ; and, for convenience, the vertical or seismic abscissa of the former is on a scale which bears to that of the latter the ratio of 100 : 1 ; the ordinate of time, which extends to the cycle of an entire year, and is divided and marked for the twelve months in order, is the same for both figures. As the months, in fact, involve or contain the seasons of the year, and indeed all other divisions of our solar revolution, and as the latter are unlike for opposite hemispheres, and are hereafter to be compared, such subdivision is necessary.

Examining figs. 1 and 2, Plate VIII., we find in the northern hemisphere the annual paroxysmal minimum in July ; in the southern it appears to be in March. The duration of this minimum in the northern extends, with no very considerable fluctuation, over nearly two months, and suddenly rises

in July; in the southern the minimum is more suddenly arrived at, and is suddenly abandoned, and it extends over less than one month.

If we take May and June as one minimum in the northern, we have a second but very much lower one in September, and the corresponding second minimum for the southern hemisphere in August.

The annual paroxysmal maximum for the northern hemisphere is distinctly in January, and for the southern in November.

January and March are second maxima in the southern, as August and October are in the northern.

Whatever be the irregularities month by month however, the preponderance of seismic paroxysm for the whole twelve months lies amongst those that form the winter of our northern hemisphere.

In Plate IX. figs. 1 to 6, curves are drawn for mensural energy, for several corresponding periods for the northern and southern hemispheres. Figs. 1 and 2 indicate these for the whole period before, and for sixteen centuries after the commencement of our era. Here the northern minimum falls in July, and a second minimum in October, while the southern minimum falls in April, and the second before September, approximating then to accordance with the curves of the whole catalogue, but less pronounced. Then for later but shorter observed periods, figs. 3 and 4 give the mensural energy for A.D. 1700 to 1800, and figs. 5 and 6 for A.D. 1800 to 1850, being the half century in which, for convenience of comparison, the ordinate at time is double the scale of the other figures, the whole twelve months being represented by an ordinate of equal length in all.

In the eighteenth century, then, we find in the northern hemisphere the minima less distinct, occurring in July and September, and the maximum in January, with a second maximum between October and January; and in the southern hemisphere, the minima about March and September, and the maxima in May and December.

Again, in the first half of this nineteenth century we have (fig. 5) the northern minimum in June, a second but less marked minimum between November and December, and the maximum again in January and February; while in the southern hemisphere we have (fig. 6) the seismic minimum in March, and a second but much less marked one between July and August, and the maximum in November, with feeble indications of a second slight one in June.

Such are, then, the results of our monthly discussion. Comparing both hemispheres, they show several points of general agreement, and some of decided want of accordance. Little comparative weight can be ascribed to the few observations as yet made in the southern hemisphere, where so large a proportion of the earth's surface is covered by the ocean, and where so little of the land has, until a very late date, been the subject of observational record at all. It would seem warrantable therefore not to permit any such unaccordant phenomena between the two hemispheres to obscure the strong presumption which the facts otherwise support, that there really is a seismic paroxysm in the months forming the end and commencement of the civil year. It may not have a natural or cosmical basis, it *may possibly* be one of the accidents inseparable from an observational catalogue; but both this extended catalogue, and nearly all the partial catalogues of others, indicate it as a fact, and one not absolutely without some extraneous support in the present state of our knowledge.

When we group the consecutive months into four seasons, spring, summer, autumn, and winter, and reproduce the curve of seismic energy for the whole year, and separately for each hemisphere and for the whole period of the

catalogue, the same relation of scale as before (figs. 1 and 2, Plate VIII.) being maintained between the northern and southern abscissæ, we find some of the apparent anomalies disappear. In fig. 1, Plate X. the curve of season for the northern hemisphere assumes a very regular form, and gives a decisive minimum for the summer season (in May and June), and an equally clear maximum for the winter season (in December and January).

In fig. 2, Plate X. the corresponding curve for the southern hemisphere, however, still shows two maxima and two minima, the maximum at the commencement of winter, with second maximum at midsummer; the minima in spring and autumn assuming the months constituting the respective seasons reversed in the two hemispheres. It must be borne in view, however, that the base of induction for this hemisphere is from only 223 observations, against 5879 in the northern; that if the southern curve had been drawn to the same vertical scale as the northern, it would have appeared to the eye as almost a straight line; so that very little weight is to be attached to the discordance it appears to present to the corresponding curve, its necessarily exaggerated scale falsely addressing the eye.

In fig. 3, Plate X., the two curves preceding are combined, but to the same scale of vertical or of seismic abscissa; and the result shows how little in reality the data that we possess as yet for the southern hemisphere are capable of modifying the facts we have for the northern. The southern curve, in fact, scarcely alters to the eye the preceding northern one; and the new curve of season for both hemispheres presents still the winter maximum and summer minimum.

In fig. 5, Plate X., a curve has been obtained for the whole period of the catalogue and for both hemispheres, representing graphically all recorded earthquakes occurring near or at the equinoxes and solstices (the *critical epochs* of Perrey and others) within a limit of twenty days, i. e. ten days before and ten days after each equinox and solstice. The base of induction is moderately large, the catalogue containing the following numbers:—

Vernal equinox (March 10—30)	310
Summer solstice (June 11—July 1)	254
Autumnal equinox (Sept. 13—Oct. 3)	249
Winter solstice (Dec. 11—31)	318.

This we may call the equinoctial and solstitial curve of comparative seismic energy. It indicates a distinct maximum about the winter solstice, and an equally distinct minimum rather before the autumnal equinox. Taking the average of the whole year for any lengthened period, it may admit of much doubt, whether there is any real seismic paroxysm at the equinoxes and solstices, although a clear preponderance is shown by our catalogues at two out of the four annual epochs at which all are recorded; yet, from the accordance of Perrey's results with those given by this much larger base of induction, we cannot put aside the possibility that the fact may have a cosmical basis.

The most direct connexion in such case that we should expect to find, with other ascertained periodical phenomena, would be with the annual march of the barometer. In fig. 4, Plate X., the annual curves of mean mensual barometric pressure are laid down to the same scale of ordinate for time as the equinoctial and solstitial seismic curve below (fig. 5), giving the variation in atmospheric pressure for places in several and distant latitudes, Macao, Havanna, Calcutta, Benares; and in Europe, Halle, St. Petersburg, Berlin, Paris, and Strasburg,—the curves themselves having been reduced from those of MM. Buch, Dove, and Kaemtz.

On comparing these barometric curves with the seismic one, an obvious

similarity addresses the eye. Is there any real relation, however? In the First Report (1850), p. 68, &c., I have treated of the relations of atmospheric pressure with earthquakes, and at p. 78 have indicated a possible link of connexion of a *direct* character between them, and shown how it is conceivable that local increase of barometric pressure, and diminution simultaneously elsewhere, may conspire with other conditions to bring on volcanic action, and hence earthquake; and Perrey has hinted, in his memoir on France, p. 98 (4to), at some relation between his seismic mensural curves for Italy and Europe, having a minimum in November, and Dove's barometric curves, given in Pogg. Ann. for 1843, pp. 177, 201, which show something analogous (*quelque chose d'analogue*). Here we observe (comparing figs. 4 and 5) the barometric minima very closely correspond with the seismic minima, and *vice versa*. Bearing in mind the fact, that, as the sun gets nearer the zenith with the advance of spring and summer, the barometer falls, and that, taking the whole earth together, the atmospheric pressure is less over those portions of its surface where it is summer, and greater over those where it is winter; and that these differences of pressure are greater in general as the latitude is lower, so that simultaneously that hemispheric surface of the globe which is at the time most heated by the sun is also least pressed upon by the atmosphere, and *vice versa*; it seems warrantable to presume a cosmical and even a possibly direct connexion between the two phenomena; and this receives, again, some support* from the fact (though not without large exceptions), that on the whole the great earthquake bands of the world pass through low latitudes, where these barometric and thermic fluctuations are most developed.

It would be worse than useless, however, to speculate minutely upon the physical relations of those facts, in the present imperfect state of our knowledge of their connexion.

The attempts which I have made to ascertain an absolute relation in number, from any discussion of the Catalogue, between the recurrence of seismic paroxysm at the equinoxes and solstices, and at an equal period of twenty days throughout the whole range of time, have been nugatory; it is impracticable to extricate a result, in which any confidence could be reposed, from the observational expansion and irregularities with the advance of time.

We must not be discouraged, however, that after the vast labour bestowed by so many, upon cataloguing earthquakes and discussing the results, we find these do not bring us even to the threshold of positive knowledge, and that the main reward of toil so far, is the having cleared away rubbish, and at length ascertained how far lists of facts, such as have been hitherto compiled from the best available materials, are of any further use. General Sabine, in his Introduction to vol. iii. of the 'Magnetical and Meteorological Observations made at Toronto,' p. vii., when narrating the former state of magnetical science as compared with its present position, says, "a few of the German observers had begun to note the disturbance of the horizontal force; but as yet no conclusions whatsoever as to their laws had been obtained:" in the words of the Report, "the disturbances apparently observe no law." Such may almost be said, as to our present knowledge of the distribution of earthquakes in time and in space, as referable to any natural law. We know how the position of terrestrial magnetism has become altered since the time referred to above by one of its best promoters; let us expect the same for seismology, and await with hope the rich flood of light that its

* See also Mylne, British Earthquakes, Edin Phil. Journ. vol. xxxi.

laws, when once reached, must shed upon terrestrial physics. The period of mere cataloguing (like that of fossil-list making in the earlier geology) seems now past; we must give it up, and, in the words of Herschel, "we must now grapple with the palpable phenomena, seeking means to reduce their features to measurement, the measures to laws, the laws to higher generalizations, and so, step by step, advance to causes and theories." (Address, Camb. 1845.)

Many cases are recorded in the Catalogue of Earthquakes, of shocks occurring at two very distant places upon the earth's surface, but felt simultaneously, or nearly so, at both. The coincidence in time is, for all *very distant* places, rendered extremely doubtful, from errors of observation and of clocks, and of their reduction for difference of longitude when the places are not on the same meridian.

Milne also has collected several such instances; for example—

February	1750...	England and Italy.
March	1750...	England and Italy.
May	1750...	England and Calabria.
August	1750...	England and European Turkey.
February	1756..	England and Central France, Holland and the Rhine.
November	1756...	Scotland and Malta.
January	1768...	Shetland and Central England.
December	1789...	Edinburgh and Florence.
February	1818...	Great Britain and Sicily.
September	1833...	England and Peru.
August	1834...	Scotland and Italy.
September	1834...	England and Peru.

In these, however, the coincidence in time cannot be assured within several hours; and it must be admitted, with Mylne, that the probability of anything more than mere coincidence is extremely slight.

In 1840–41 he found three shocks of this character: viz.

March	1840.....	Scotland and Germany.
June	1841.....	Terceira and St. Louis.
July	1841.....	Scotland and France.

(Edin. Phil. Journ. xxxi. to xxxvi.)

A few such instances, that possess a closer approximation in time and some additional probability of actual coincidence, have been extracted from the Catalogue, and have been drawn in the diagram (Plate X *bis*) to scale,—those which had horizontal components of motion in the meridians N. to S. or S. to N. being placed at the right and left sides of the great-circle section of the globe; and those with horizontal movement E. and W. or W. and E., placed above and below.

Right lines connecting the supposed distant points of coincident shock by chords of the circle, would *probably* pass through the origin or centre of disturbance common to both places on the surface. The origin might be deeper to any extent, and *possibly somewhat* nearer the surface, at least in the cases of the longer chords. Were any reliance to be placed upon these coincidences, some of them would thus give a depth of origin of about 800 miles below the surface. None of those, however, that appear to have any satisfactory evidence of a real connexion in time and in origin, suggest a depth for the latter of even one-tenth that amount. All our other know-

ledge, both of seismic and volcanic phenomena, leads to the conclusion of foci very much nearer the existing surface; and the diagram may be regarded as conclusive evidence that these presumed coincident earthquakes at very distant points, even if proved simultaneous, are unconnected, and have different origins.

In the most singular case on record, that of Ochotzk and Quito, places nearly antipodal, the common origin would actually be in, or not remote from, the earth's centre; and it is not conceivable that the shock, which, if sufficiently powerful, must in such cases be felt nearly simultaneously over the whole globe, should have been confined to the two extremities of a single diameter.

In recapitulation, it may be convenient to give in *numbers*, for occasional reference, a few of the salient results of the distribution in time, already graphically discussed:—

	No. of Earthquakes.	No. of Years.
Total number of recorded earthquakes up to A.D. . . .	58	1700
Total number from A.D. to end of the ninth century . .	197	900
Total number from the beginning of the tenth to the end of the fifteenth century	532	600
Total number from the beginning of the sixteenth to the end of the eighteenth century	2804	300
Total number from beginning of nineteenth century to the end of the year 1850	3240	50
Total Catalogue	6831	

The number of great earthquakes (*i.e.* those, as already defined, in which whole cities and towns have been reduced to rubbish, many lives lost, &c.) have been but imperfectly exhibited graphically, and not at all for the later centuries, from their too frequent recurrence making their notation difficult or confused; they are here given numerically.

Number of great earthquakes from third century B.C. to beginning of our epoch	4
Number of same from A.D. to the end of the ninth century	15
Number from beginning of the tenth century to the end of the fifteenth century	44
Number from beginning of the sixteenth century to the end of the eighteenth century	100
Number from beginning of the nineteenth century to 1850	53
Total	216

If we double the last number but one, to embrace the entire 100 years, the correspondence between the results for the two last periods is remarkably close, viz. 100 and 106,—and although the series is still an expanding one, yet as the numbers for the 16th and 17th centuries are not large; it is probable that for the last 150 years at least, our news of all *great* earthquakes have been complete, and the cataloguing of *them* perfect, showing that at present we may calculate upon 1.37—say 1.4, or nearly $1\frac{1}{2}$ recurrences of great and disastrous earthquakes every year, at some one or more places on the earth's surface, or one great earthquake disaster every *eight months*.

The total number of earthquakes, classed by months, is as follows :—

	Northern.	Southern.	Seasons, North.	Seasons, South.
January	627	19	1669	42
February	539	14		
March	503	9		
April	489	17	1355	56
May	438	20		
June	428	19		
July	415	18	1366	47
August	488	12		
September	463	17		
October	516	25	1489	78
November	473	32		
December	500	21		
Totals	5879	223	5879	223

Total of Catalogue for both hemispheres capable of mensual classification	6102
Total of unclassified, except as to annual date	670
<hr/>	
Total number catalogued.....	6772

of which, there are recorded by season only—

Spring	6
Summer	7
Autumn	7
Winter	5
<hr/>	
Total.....	25

January, February, and March have been taken for the spring of the Northern Hemisphere, and for the Southern, July, August, and September. From the commencement of Catalogue to A.D. 1700, the recorded earthquakes in the northern hemisphere are to those in the southern, 940 : 21, or as 44·3 : 1. Again, from A.D. 1700 to 1800, the northern are to the southern, 1883 : 57, or 33 : 1; and from the year 1800 to 1850, or conclusion of the Catalogue, the northern are to the southern, 3076 : 145, or 21·2 : 1,—a further indication of the effect upon any such statistic record, of the march of human discovery, the last fifty years having brought into play the vast seismic regions of the Southern Ocean and South Pacific, before all but unknown. The observed earthquakes in the Southern Hemisphere may now be *estimated* at from 43 to 50 per century, or one every two years. (See Appendix, No. II.).

Distribution in space.

Such are, perhaps, all the legitimate conclusions that we can now come to on the distribution in historic time; and we now proceed to the discussion of the Catalogue, with respect to their distribution in space upon the surface of our earth. The method adopted, was that of graphically reproducing the area of each recorded earthquake by the superposition of coloured tints upon a large Mercator's map of the world. The map chosen for use was that arranged by J. Purdie, and published by Laurie, London, 1851,—the dimensions being 75 inches by 48 inches, which admitted, from its large

size, of perfect clearness and accuracy in the laying down the most complex localities, and those in which the shocks are most numerous. This has been reproduced to a much reduced scale (Plate XI.), to accompany the present Report; but although executed with much skill and care, by the lithographer and engraver, I find with regret that its small size has rendered a perfectly accurate transcript of the original impracticable, and that a very imperfect notion of the latter is conveyed by the reduced map.

Strictly, the limits of every earthquake are completely indeterminate; and were our globe perfectly solid, homogeneous, and elastic, no limits but its own could be assigned to any shock from whatever centre originating. The practical limit (so to speak) is, however, where the movement has become insensible without instrumental aid; for such have been all the observations dealt with in our Catalogue. This frequently embraces enormous surface-areas; but these seldom, perhaps nowhere, are symmetrically posited round the centres, or presumed centres, of disturbance.

We are not concerned here with any of the smaller or local circumstances that modify, in different radii traced from any seismic centre, the effects, and the directions and distances, to which they are sensibly transferred, but merely with some of the greater and constant conditions (for the same region) in which some of the great natural features of the earth's surface permanently modify or limit the transference and area of transfer of earthquake-waves transmitted from adjacent centres. Thus, along the whole chain of the South American Andes, the propagation of shock is greatly more towards the west than to the eastward,—the highest crests and intermediate valleys forming a rude sort of limit, beyond which, to the eastward and into the heart of the table-land of the continent, shocks felt with destructive effect down to the shores of the Pacific are propagated with greatly diminished force, or rather are so felt upon the surface.

Again, to take another large example, the Northern Indian earthquakes, whose origin is in Nepal and along the central Himalayan axis, are propagated southwards and westwards into the great plain of India, far more than northwards into the enormous mass of table-land of Central Asia. We are at this moment not concerned with the causes of this, but simply with the fact, that in these examples, and in several analogous instances, it is a matter of observation that certain great natural features of the earth's surface and material, do modify the forms of the surface-areas shaken, and render them unsymmetrical, shortening the radii in one direction, lengthening them in another; so that the area, which in a more homogeneous mass would approach a circular or elliptic form, tends to an elongated, linear, or irregular outline.

In laying down, then, the forms and sensible area of shock of each earthquake catalogued (and often necessarily, from the imperfect data alone afforded), the following rules were adhered to:—

- 1°. When the form and sensible limits of the shaken area were ascertainable from the narratives, they were adopted.
- 2°. When these were wanting, as in the great mass of cases recorded, then, as respects form, the physical, geological, or other conditions of each area, known to modify the distant propagation of shock, were attended to.
- 3°. As respects sensible area, when this could not be ascertained for any one diameter of the shaken area, from the narratives, certain arbitrary conventional rules (founded upon a natural basis, however) were resorted to.

The method of colouring therefore was this. The whole of the recorded earthquakes of the Catalogue were subdivided preliminarily, with as careful a judgment as possible, into three great classes :—

- 1°. Great earthquakes, being those in which, over large areas, numerous cities, &c., were overthrown, multitudes of persons killed, rocky masses dislocated, and powerful “secondary effects” produced.
- 2°. Mean earthquakes, or those which, although perhaps having a wide superficial area, were recorded to have produced much less destructive effects upon cities, &c., and little or no changes upon natural objects, and scarcely any loss of life.
- 3°. Minor earthquakes, limited to those which, although sensible and producing in their full development some effects (fissures, &c.) upon buildings, did not affect natural objects at all, and left few or no traces of their occurrence after the shock.

Of the first class, the great Lisbon shock of 1755 may be taken as a familiar type. Of the second, examples are frequent over Central Europe and the Mediterranean basin, Southern Asiatic Russia, &c. And of the third class we find notices almost daily from every quarter.

As respects the very smallest development of this class, namely, the continuous tremors of Comrie, Pignerol, &c. &c., they were grouped into single shocks upon the same method as described previously for their discussion as to distribution in time.

To distinguish these three classes upon the map, three different intensities of water-colour tint were prepared—all from the same colour (red ochre and Indian yellow). The first and most intense having been decided to designate the first class, that for the second was obtained of one-third the intensity, by dilution with three volumes of water; and the third by dilution of the second with three volumes again,—the intensities of the three tints being therefore as the numbers 1, $\frac{1}{3}$, and $\frac{1}{9}$, or 9, 3, and 1. A single wash or application of the tint relative to its class, upon the given locality, designated each earthquake when laid down on the map; and the *form* or *boundary* of the tint, when not to be had historically, being ruled by physical considerations as already briefly described, the *extent* or *superficial area* of the tint (when not derivable from the narratives), was arbitrarily fixed by the following rule :—

- 4°. The extreme radius of great earthquakes (1st class) was assumed equal to 9°, or about 540 geographical miles; that of the 2nd class at 3°, or 180 geographical miles; and that of the 3rd at a single degree, or 60 geographical miles.

These were determined from the consideration that our records give, when viewed with a broad glance and apart from physical and local limiting conditions of a powerfully disturbing character; i.e. when the area of disturbance has had a sensible surface-boundary approaching to an irregular circle or ellipse,—a sensible diameter of about 1000 to 1200 miles for great earthquakes, and about 400 for those of our second class, those minor ones of the third seldom extending to above 100 or 150 miles in diameter.

In the case of the enormous surface-areas of the first class, however, it has rarely been necessary, in the later years of the catalogue period, to make use of this convention at all, the historic boundaries being usually attainable. These in many cases comprise areas of surprising extent: thus the great Nepaul earthquake of 1833 extended sensibly over 7° lat. by

15° long., a surface four times that of Great Britain, and twice and a half that of France.

The Cutch earthquake of 1819 extended from E. to W. 5°, and from N. to S. 6°, though its dimensions in latitude are rather ill-defined. (*Asiat. Journ.* vol. xii. n. s.)

The Lisbon (1755) earthquake, and a few of those of the Malayan and Calabrian groups, and of South America, were sensible in certain surface-radii or great circles over 18°, or perhaps even 20°; but these are the extreme developments of our first class, and their limits historical, and therefore not affecting the preceding conventions. Some earthquakes recorded in the catalogue it was necessary to omit laying down upon the map at all, inasmuch as no sufficient data could be gathered to fix a probable local surface centre, nor any information as to the comparative energy of the movement. For example, some earthquakes (though but few) will be found catalogued as "in China," "in Libya," &c., with scarcely any particulars given. These omissions are not sufficiently numerous to affect the main result.

Besides these inseparable elements, volcanic and seismic phenomena, another intimately related phenomenon has been marked, as far as the data enable it. Those tracts of the earth's surface which have been presumed, with more or less probability, to be in slow process of subsidence to a lower level, are marked by blue tints, the boundaries of which are undefined to a great extent. These embrace the coral tracts of Darwin, the west coast of Greenland, and a small tract of the southern shores of the Baltic. All minor subsiding areas close to or in the midst of volcanic centres (such as the shore of Italy near Naples) are unnoticed, as such changes of level, due to the immediate action of adjacent volcanoes, are almost perpetual, and, in proportion to its state of activity, &c., common to every such area over the globe.

On examining the Mercator map (Plate XII.), then, upon which, subject to the above rules, the whole Catalogue has been graphically represented by tinting, it is to be remarked that—

1. The whole of the earth's surface known to be subject to earthquakes will be found tinted more or less intensely.
2. The most deeply tinted surfaces mark the places where either the number, or the intensity, or both, of successive earthquakes are the greatest.
3. Whether at any one point the depth of tint be due to number or to intensity, and the relation between these, may be found by reference to the Catalogue itself.
4. The shading-off or evanescence of tint towards the extreme sensible limits of the seismic (coloured) regions over the whole map is due (not to shading or evanescence of colour in the artist's sense, but) to the *superposition of tints only* upon the principles already explained. Hence it follows (admitting the two conventions made, as to intensity and area, and the partial extent to which these influence the results historically gotten), that the tinting upon this seismographic map does as truly represent, over our earth, the known seismic regions in form and extent, and the relative intensities and successive developments of seismic action therein, as the contour lines of a contoured map represent the forms of irregular surfaces, and the rate of inclination of the slopes and valleys by their approximation or separation; or as truly as (upon certain engraved maps, e.g. Irish Railway Commission of Ireland and some German ones) the relative heights and rapidity of rise of mountain chains are

graphically represented by multiplying the engraved lines that produce the shades (or tints) in the joint ratio of the heights and rates of slope, i.e. as the sines of the angles upon a given base.

I therefore venture to present this map as more than a mere picture—as being, in fact, a first approximation to a true representation of the distribution of earthquake forces, so far as they are yet known, over the surface of our world.

The volcanoes (including fumaroles and solfataras) are shown by black dots, and all that are known to be in activity, or are recorded to have been so, or from other evidence may be presumed to have been so, within the historic or late geologic periods, have been represented, from the authorities of Johnston, Berghaus, V. Hoff, Daubeny and others.

The exactitude of the number of volcanic vents along the great lines of foci, is, however, less important to our object than the marking in of isolated volcanoes.

Let us now examine our map in detail, and see what it can teach us, taking for the starting-point of our seismic survey the meridian of Greenwich, the central point nearly of the dry land, and passing eastward in our review. But first let us notice some points in the physical features of the earth's surface. Of the 111,000,000 of square miles of ocean (in round numbers) covering three-fourths of the surface of our globe, the greater part is to us a blank, so far as direct observation is concerned, the exceptions being the Atlantic with a part of the Southern Ocean from about 10° S., northwards, and of the Northern Ocean up to nearly 70° N.,—nearly all other marine seismic observations being in connexion with centres upon adjacent land.

We see these enormous pelagic areas, consisting of irregular, saucer-shaped, shallow depressions, bounded by flowing coast-lines which, by the connecting points of oceanic banks and islets, we can generally unite into closed curves, forming thus distinct but inosculating basins—of which the Northern and Southern Pacific together form the largest example. Those vast but comparatively very shallow depressions may, when viewed in individual detail, be subdivided into smaller shallow concavities by banks and shallows below the ocean surface. But each great oceanic saucer, bounded by the existing continents and their fragmentary outliers, presents an almost continuous fringe around, of mountain-chains and volcanic foci. Thus, starting from Mount Elias, long. 141° W., lat. 60° , at the northern extremity of the Pacific, we find a scattered chain of volcanoes along the west coast of North America, with a continuous bounding coast line of mountains. South of the gulf of California, the Mexican and Central American volcanoes, with those of the South American Andes, carry on a closely linked chain, almost to its southern extremity. Here the volcanoes of Tierra del Fuego trace the line on towards that of Graham's Land, where it plunges into the unknown regions of the Antarctic continent.

Returning to the extreme north again, from Mount Elias, we have the almost unbroken line of mountain and volcano of the Aleutian Archipelago; carried down through the great elevated peninsula of Kantschatka, the Kurile Isles, Jesso, Japan, the Philippines; and to the north of New Guinea by its volcanoes and those of New Britain, the Solomon Isles, Egmont, New Hebrides, New Caledonia, and New Zealand, to the Antarctic ice again at the Balleny Islands and Buckle Volcano—a connected belt, with the exception of the unknown Antarctic region, round its vast pelagic circuit. Within this the subordinate or secondary basins are marked, though less distinctly, by lines of volcanic foci: thus from Japan to New Ireland through the Ladrone Islands, a distinct though sparse line of volcanoes cuts off the basin

(nearly one-half the area of Africa) bounded on the north by Japan, and on the west by the Philippines.

From lat. 30° S., a sub-oceanic crest-line of shallows appears to spur off eastward from the volcanic foci of New Caledonia and New Zealand, and, trending westward and a little northward through the Tonga, Society, Marquesas, and Gallapagos Islands, connected by continuous banks, joins the Central American group of volcanoes, thus cutting the great ocean basin nearly into two secondaries, each of which is probably in a less marked manner subdivided,—the northern sub-basin, by a line through Christmas and the Sandwich Islands, to some point of the volcanic group of the Andrenofsky Islands in the Atlantic Archipelago, making in its course a wide sweep to the east and north through an almost continuous chain of isles and banks; and the southern sub-basin by a line from the Society Islands through Easter Isle and Juan Fernandez, and combining with the great Chilean volcanic chain at its eastern extreme.

A vast fissure (noticed by Humboldt), and marked by an almost continuous line of volcanic vents, extends in a direction nearly east and west, right across Mexico, between lat. N. 18° and 19° . It is nearly 500 miles in length. Its main direction, if produced, bears upon the volcanic island of Revillagigedo, and, as Humboldt also thinks, probably extends to Muna Roa, in the Sandwich Islands. The Mexican extremity of this enormous crevasse probably marks the continental end of one of the great dividing ridges of the sub-basins of the Pacific.

Within the great Pacific Basin will be found (tinted blue) most of those great areas of probable subsidence indicated by Darwin*. These bands will be observed occupying the great sub-basins of the ocean, not very distant from great volcanic lines, and although not (with our present imperfect knowledge of soundings) quite free from the suspicion of occasionally intersecting such lines (e. g. Marquesas and Society Islands, Ladrone, and New Guinea), yet, on the whole, keeping surface positions intermediate to the volcanic cinctures adjoining or around them.

Less distinctly we may trace the cincture of mountain- and volcanic chain around the shallower Atlantic basin, and, through it, upon the submarine elevations dividing its sub-basins. Thus, starting from Iceland; the Ferro Isles, Scotland, and the mountains of Wales and England (with the breach of the English Channel, a narrow line in relation to the scale of our present survey), the Rhenish-German chains, the French and Western Alps, the Pyrenees, to Cape Finisterre and the coast of Portugal, connect by the Azores, and by innumerable submarine rocks and shoals, across to Newfoundland. Here the lines to the northward may be pronounced unknown, until, returning back to Iceland, we find it approximates to the point we left through the great igneous and abrupt coast-line of Greenland.

In connexion with this oceanic basin, we have two probably subsiding tracts of land—the one in Davis's Straits, the other in the Baltic—both tinted blue.

The Central Atlantic forms a well-marked basin girded with volcanoes and mountain-ranges. Leaving the last stated boundary-line at Newfoundland, and going again eastward to the Azores, thence through Madeira to the Canary Isles, the Cape de Verdes and including the great sub-oceanic volcanic region between 15° and 30° long. W., and lat. 5° N. to 10° S., going westward by the island of Fernando Noronha to Cape St. Roque on the extreme east of the South American continent, returning to Newfoundland,

* See Dana on Areas of Subsidence in the Pacific. Ass. Amer. Geol., Albany, 1843, and Edin. Phil. Journ. (New), vol. 35 p. 341

we trace the line southwards through the several chains of the United States down into Georgia, where, with the comparatively narrow breach of Lower Florida, it is carried on by Cuba and the whole chain of volcanic islands of the West Indies to Trinidad and the South American continent again. The Gulf of Mexico and Caribbean Sea form a smaller but separate basin. In the southern Atlantic we can trace a dividing ridge through South Ascension—the great suboceanic tract just referred to—North Ascension, St. Helena, and probably to Cape Negro on the African west coast, and thence to the Cape of Good Hope, and returning westward by Tristan d'Acunha, thence S.W. to the Isle of Georgia (lat. 55° S.) and through the Falkland Islands to the volcanoes of the southern point of South America; but this, like the sub-basins, through the scattered indications which alone we yet have in the vast southern portion of the Eastern or Indian Ocean west of Australia, is uncertain.

There is little doubt that Australia, on its northern existing coast-line, was once united with New Guinea and the Aru Islands west and south of it (Wallace, *Silliman's Journal*, vol. xxv.), and possibly with much of the land outlying to the west of that vast and now isolated continent; if not, the intermediate seas would be much deeper than they are, and the west coast of Australia with its mountainous chains would bound an ocean basin whose western boundary would be marked by a line of volcanoes from New Guinea to New Zealand and the Southern Sea.

The seas of Ochotsk, of Kamtschatka, of Japan, and, above all, the Chinese and Malayan Seas with Borneo in the midst, form so many distinct basins, small relatively to the vast areas we have been reviewing, but distinct and strongly marked. In the Chinese Sea we have a probable tract of subsiding land, tinted blue upon the evidence of Darwin. The bay of Bengal, well-marked all round northward from Sunda, and belted with volcanoes to the Ganges, and with mountains near the coast thence to Ceylon, joins probably Western Australia by a suboceanic ridge, indicated through the rocks of Greville and Compton, the Island of Apaluria with the adjacent submarine volcano of 1789, and the ocean shallows and soundings, about 100° W. long. and 20° to 25° S. lat.

The separate basin of the Arabian Sea is equally distinct, from Cape Comorin along the Malabar coast, all highly mountainous, Beloochistan to the mouth of the Persian Gulf (itself a small basin), thence by the Arabian coast-line to the volcanic region at the mouth of the Red Sea, and into Abyssinia with its characteristic and enormous crater-form lake of Tzana (though as yet not possessing any earthquake record), and thence through regions scarcely known upon the East African coast, crossing to the Comoro Islands (volcanic) and to the mountainous regions of Madagascar,—the volcanic islands of Bourbon, Mauritius and Rodriguez, the Nazareth and Saya banks, the Chagos Archipelago and the Maldive and Laccadive Islands, completing the cincture with the Malabar coast again.

Along the great band of these islands, and thence trending westwards by the Saya bank, lies one of the great tracts of ocean-floor which Darwin has shown to be probably subsiding (tinted blue). Assuming that this really is a band of subsidence, it would be more probable that the volcanic girdle takes a wider sweep to the south and west of this band, and, leaving the Island of Rodriguez, makes for the volcanic centre marked in the ocean at long. 90° E., lat. 10° S., and thence turns northward to join Ceylon, Cape Comorin and the volcanic region of Pondicherry.

Leaving the great ocean and great continent, we trace smaller basins (or rather saucers, for their extreme shallowness in relation to their surface-area must never be lost sight of), where larger portions of the elevated moun-

tain-cincture, studded here and there with volcanic vents, are found submerged and inland (*i. e.* where the basin within its boundary is partly land and partly water), thus: *Ætna*, *Lipari*, and *Vesuvius*, the Apennine chain, the southern and western Alps, the Pyrenees, and the great tableland and axial chains of the Spanish peninsula, with the mountains of Northern Africa, on through *Pantellaria* and *Sicily*, form one such basin. Closely connected with this is the adjoining basin of the *Ægean* with the volcanic Greek Islands: the Black Sea, with the volcanic regions of Armenia and the Caucasus, form a distinct basin extending on the north far into Russia; the Caspian, with the Sea of Aral and the plain of Tartary embracing Persia, another, having its own volcanoes near the former sea, while Central Asia, so little known, seems probably divisible into several vast saucer-like areas, north of the great tableland, of which the great lakes and the *Altai* chains, with their imperfectly described volcanoes, probably mark some parts of the cinctures, but which, in the absence of knowledge as to relative level, it would be premature to attempt to trace. Many of these basins further on to the north appear no longer bounded by closed curves upon land, but to open out along the great river-courses which run northward and become lost to our knowledge in the icy solitudes of northern Asiatic Russia.

Northern Europe presents us with the great Scandinavian, German, and Russian saucer, whose features have been made so clear to us by the labours of Murchison and others; while, further north and west, a distinct oceanic basin appears in the Northern Sea, of which the Norwegian chain, *Shetland*, the *Ferro Islands*, *Iceland*, the west coast of *Greenland*, and the volcanic islands of *Jan Mayen*, are the marked boundaries.

North America, so far as its surface has been ascertained, is divisible into several well-marked shallow basins, the most obvious being those of the *Mississippi*; of the Arctic Highlands; the two deserts east and west of the *Rocky Mountains* (lat. 30° to 40° N.); and of the great lakes, to which may be added hereafter *Labrador* and the North of *Canada* with *Hudson's Bay*; the eastern talus of the great Atlantic slope falling into the boundary of the Atlantic basin. Enough, however, has probably been stated to indicate that, viewed upon the broadest scale, the surface of our globe consists, as respects its present solid surface, of a number of saucer-like depressions, when large, having also *convex* central areas, all having plan outlines approximating to extremely irregular ovals or other closed curves, and bounded by mountain-chains or mere rounded or flat-topped ridges or elevations of the solid sphere, greater or less. Where three or more of these inoscuate, the point between the junction is most frequently a group of mountains or a high tableland, or both,—as, for example, the knots (*Cusco* and others) of the South American *Andes*, upon which the suboceanic ridges abut. The greatest of these saucer-like concavities either form or subdivide the beds of the ocean, but other such shallow basins can be traced upon the existing land, and embracing seas or parts of seas, or great lakes, or river-courses within them, but still enclosed by girdling chains of mountains or the precipitous flanks of tablelands, which latter in their full development are the pedestals of the greatest mountain-chains. Amongst the wide-sweeping curves that indicate the dividing crests (if we may use such a word to designate elevations often, especially in the subdividing ridges of the oceanic sub-basins, so very low in relation to the areas they separate) of these vast oceanic basins, it appears impossible to trace any approach to parallelism, or, indeed, that such an arrangement could exist.

We do, however, remark, that it is along these girdling ridges, whether mountain-ranges or mere continuous swelling elevations of the solid, which divide these basins beneath the ocean surface one from the other, that all

the volcanoes known to exist upon the earth's surface are found, dotted along these ridges or crests in an unequal and uncertain manner.

And as our oceans and greater seas are bounded, and below their water-surface subdivided, by these ridges, along the lines of which the volcanic foci are found; so, as long observed, it is a fact that all active volcanoes are comparatively close to the sea, or to some large body of water; indeed, they could not present the phenomena they are known to do, without a supply of water, and nearly always of sea-water, more or less constant and plentiful, derived from this propinquity. (See Trans. R. I. Acad. vol. xxi. pp. 98, 99.)

However different, then, may have been the train of forces upon which the elevation of the mountain-chains and other relatively raised lines of the present surface have depended, from those which now produce the ejections thrown up by volcanic action, the latter seem to follow upon the traces of the former; and we shall find that the earthquake generally does so likewise. The distinction long made, into linear and circularly grouped or clustering volcanoes, I conceive has no foundation in nature. By far the largest proportion of all the volcanic vents over the whole earth are found arranged along the flowing lines of mountain-chains.

The so-called clusters or *circular* groups never are found covering surface-areas larger, if so large, or more widely apart, in any single group, than those within which volcanic vents are found that undoubtedly belong to linear arrangements (Mexico for example).

Nearly all the clusters or circular groups of volcanoes are situated in the ocean, and far from continental land; they stand on, and are connected with each other, by oceanic plateaux, rounded submarine ridges, shallows, rocks, and islands, and by similar connexions with points of continental coasts, either mountainous or volcanic. The conclusion seems justifiable, that these clusters or groups are the only visible points, "few and far-between," situated along sub-oceanic linear volcanic ranges, along which the open vents are probably much fewer than along equal lengths on land, but still marking as truly as the most thick-set linear vents the great lines of fracture of the earth's crust. Were this the proper place, much might be adduced in support of this view of volcanic distribution.

The connexion between volcanic and seismic effort is so obvious, although the nature of their connexion has been so little understood, that we are prepared to find the deepest tints of the seismic map fringing off from those great mountain-ranges where the volcanic foci stand close in rank; but it was not before so apparent that, along the elevated ridges or mountain-ranges that gird and divide the great surface-basins, even when not volcanic, or when volcanic foci are rare and widely separated, the earthquake is still found to range in broad bands, following the general line of the crest.

Upon a very much minuter scale of survey than we are now occupied with, such would seem dependent upon the physical fact, that the earth-wave will be best and furthest propagated through the most solid and elastic line of material, that is, in the axial line of mountain-chains and valleys, as is found to be the case; but the indication of our map is a far more extensive one, and points to some different and deeper cause. Thus, to resume our seismic survey of the Map, Iceland, Ferro, Shetland, and the south-west coast of Norway, nearly to Christiania, form a broad band of seismic connexion, which would probably run on to Greenland, and along its coast to Jan Mayen, did we know anything of their earthquake history.

The fact (if it be so), that the west coast of Greenland, in Davis's Straits, is sinking gradually, would in nowise conflict with the probability of
1858.

seismic action, or even elevation of the opposite eastern coast, which, it is extremely probable, may be slowly rising, just as the Scandinavian peninsula is doing; and it does not seem a disproportioned supposition, that all three changing levels are due to the prodigious scale of volcanic action going on at Iceland.

The Swedish system is another band stretching north-west from the great lakes to Kola Bay in Russian Lapland; and future observation may probably include in it the parallel chain of the Doffrefels Mountains. To the south we mark the broad band whose extremities are Portugal and the Azores, always in seismic sympathy with each other, and with which the band of the Canaries is in relation through Madeira, and is also more distinctly connected with the earthquakes of Barbary and Morocco.

From Tunis, a narrow but intensely marked seismic band stretches up through Sicily and Italy, sends off a spur to the west through the Alps of Piedmont and Southern France, along the whole line of the Pyrenees, and to the northern coast of Spain; and widening out over the central Alps, so as to cover a large area of central Southern Europe: extending east and west from Lyons to Vienna, it again contracts in width at about the latitude of Strasburg, and stretches away northwards over the whole Rhenish mountain system, and becomes nearly evanescent upon the low plains of Holland and the coasts of the North Sea, where, though infrequent, earthquakes are not unknown.

Over the great plain of Central Europe, and far into Southern Russia to the north of the Euxine, the want of observations with distinct dimensions renders any attempt at precise boundary nugatory. Were our records better, the Carpathians would no doubt stand out in stronger tint than the well-inhabited country of Poland and the Vistula, where the greater frequency of seismic records deepen the tint from Cracow up towards Riga. Better observations would no doubt also mark with a deeper tint a band of connexion along the Balkans and line of the Danube, between the Austrian Alps, so frequently shaken, and the Bosphorus, where the neighbourhood of Constantinople shows itself abnormally intense, from the reiterated records of earthquakes there that have been collected century after century at that ancient seat of splendour and civilization. Thus it is that the disturbing causes that we have remarked as affecting the Catalogue follow into its discussion in space as well as we have seen they do into that of time.

A broad but somewhat ill-defined seismic band stretches from the Greek Archipelago to Constantinople, spreads over a large portion of Asia Minor, and is carried through Palestine, on to the valley of the Lower Nile and the coasts of the Red Sea, extending further south along its Arabian shore. From the Gulf of Scanderoon, by Aleppo and Mosul to Lake Van, and the south of Ararat to Shirvan and Baku upon the Caspian, a wide band of great and long-continued energy extends, which probably joins into the Caucasus and is connected with the seismic system of the Ourala in the distant north.

Again, from about the parallel of Bagdad, a broad but ill-defined seismic band stretches nearly due east through the whole of Persia, Khorassan, and to the Hindoo Koosh, sending off a narrower band along the shores of the Persian Gulf. About Cabool the Persian band joins into the vast seismic area of Northern India—a band, whose northern boundary is the Himalayan chain, and which stretches nearly parallel to it from Cabool to Calcutta and to the Gulf of Cutch. Beloochistan appears exempt, but probably only because hitherto without observation or record. Leaving the vast and strongly agitated seismic system of Central Asia, of the boundaries of which

so little is yet known beyond the general fact that northwards the seismic bands appear to follow the great river-courses, or more probably the great axes bounding *them*,—and passing also the so frequently convulsed Chinese empire, which appears to have two chief seismic centres about Peking and Canton (these cities have been the *centres of observation* for all, or nearly all, the Chinese records of earthquakes that we possess, and hence one reason of the depth of seismic tint around them; but it is also to be observed that two of the great volcanic districts of the “Fire Hills and Fire Wells” of China are situated within the tinted or shaken regions adjacent to the two capitals), with a third more central volcanic region, of which I am not aware that anything is known seismically,—and remarking the apparent exemption of Cochin China, for which there are no records,—we at length arrive at the greatest and most formidable earthquake- and volcanic region upon our globe. Stretching in a vast horse-shoe, convex to the south, from Burmah and Pegu, and surrounding the great island of Borneo, with an intervening belt of sea, and reaching round to Formosa on the north-west, we have an almost continuous girdle of volcanoes and lofty mountains. Every island of the group, including Java and Sumatra, Celebes and Mindanao, is shaken with earthquakes the most formidable and frequent; and we can point to no spots upon the whole earth's surface upon which seismic energy is exhibited with an intensity equal to that of Luzon and Sumbava.

Nothing even in South America or Mexico appears to rival the grandeur of volcanic energy and resultant seismic action here. In 1815 the thunderings of Tomboro, in Sumbava, were heard nearly 1000 miles away (through the earth no doubt). The ashes, or, more correctly, the finely-divided tufadust, floating in the air, made mid-day into darkness 300 miles away in Java, and were precipitated at sea even a thousand miles from the point of ejection, while whole tracts of country, with inhabited towns, have suddenly become engulfed and disappeared during periods of eruption, which over a large portion of the chain, from one extreme to the other, are almost continuous.

It will be remarked that the seismic tint is both more intense and relatively *more circumscribed in area* along the bands that surround the linear volcanic vents, where they cluster thick, than along mountain-chains or ridges that possess few or no volcanic vents. This no doubt arises from the centres of impulse in active volcanic lines being situated at a comparatively small depth, in fact, coming from the actual bases of the crater, or not far beneath; and hence the horizontal propagation is not so great for a given force of impulse as where its centre is situated deeper, and the explosive effort rendered abortive to rupture the solid crust above. The intensity of tint in the former case is due to *repetition* of effort, as well as to occasional intensity of impulse.

An earthquake in a non-volcanic region may, in fact, be viewed as an uncompleted effort to establish a volcano. The forces of explosion and impulse are the same in both; they differ only in degree of energy, or in the varying sorts and degrees of resistance opposed to them. There is more than a mere vaguely admitted connexion between them, as heretofore commonly acknowledged—one so vague, that the earthquake has been often stated to be the *cause* of the *volcano* (Johnston, ‘Phys. Atlas,’ Geology, p. 21), and more commonly the volcano the cause of the earthquake, neither view being the expression of the truth of nature. They are not in the relation to each other of cause and effect, but are both unequal manifestations of a common force under different conditions.

Further north we have the somewhat less terrible, but yet deeply-

coloured seismic bands of Japan, the Kuriles, and Kantschatka; and, passing to the opposite shore of the Pacific, we are presented with the deep coloured seismic bands of Mexico and the South American Andes, where the influence reaches far out into the ocean, but eastward or landward checked by the great chain. The reason of this fact, which has been but alluded to, is not hard to find. The general section of the South American continent, from west to east, consists of a comparatively low-lying narrow littoral border-country on the Pacific; then the immense chain of Andes rising in successive ranges to the axial peaks, and beyond that vast plateau—the elevated land of the great continent—reaching over near the western coast, where some lower ranges of mountains terminate near the Atlantic shore and bound its basin. This is rudely shown in the accompanying figure (1).

Fig. 1.



Now if a shock be transmitted from any origin within the great chain and below the level of the great tableland, *ab*, as from a point *x*, a transmitted elastic wave in the direction *xs*, reaching the surface after a very short transit, will, in accordance with the well-known law of elastic bodies, have its amplitude increased (just as the last billiard-ball of a set of touching balls, is that which is projected when the first of the line is struck by the blow of a propelled ball), and more powerfully shake all such objects at *s* than others situated at *a*, although at an equal radial distance from the centre of effort,—the free movement of the elastic wave is here reacted upon by the elastic mass of the tableland which blocks it until compressed. Objects on the tableland, at an equal distance from the origin, may (dependent upon its depth) receive the shock (even of only equal amplitude) at such an angle of emergence as will give a power of overthrow to the horizontal component of the wave's train. There will in every case be a reflected wave back from the mass of the tableland—an *earthquake echo*—producing at *s*, or along the littoral border a second shock, with a line of direction nearly the same, but with a direct motion reverse to the first, one shock only being felt on the tableland.

To return, the seismic band of the Andes, at the extreme north of the continent, and at Trinidad, inosculates with that of the West India Islands which sweeps round the Caribbean Sea, and appears, so far as records to transmit its movements further into the Atlantic, than into the former sea; if so, that probably arises from causes quite analogous to those already explained for South America—a shallower sea-bottom to the westward of the Caribbean Sea, thus playing the part towards the deeper bottom of the Atlantic that the tableland plays towards the littoral slope of South America. The North American records have been too few and ill-defined as to bount to produce as yet any very distinct conclusions from the hints, which prove, however, that its western and southern seaboard are by no means free from earthquake. This has in great part arisen from the great want of orographic delineation on nearly all (even the largest and best) maps of the United States which omit all heights and natural features. The Californian system, the Rocky Mountains, that of Upper Missouri, of the Mississippi, and the northern lakes and basin of the St. Lawrence, form the chief and separate regions in which earthquakes have been so far observed most frequently.

Future observation will probably show a connexion between the great sub-oceanic seismic tract of the South Atlantic and the South American continent on its western sea-board, between Cape Roque and La Plata. It does not appear so far to have any connexion with the opposite African coast between Cape Palmas and the Bight of Biafra. A better knowledge will also probably widely extend the seismic boundary of the Cape of Good Hope along both the east and west shores of Africa to the northward, and bring within it the great island of Madagascar, as to which nothing is so far known. New Zealand (unhappily for its future progress) will afford one of the best regions in the world for the study of volcanic and seismic phenomena in their connexion.

The earthquake-band of Western Australia, at present so small in proportion to its vast surface, will probably be found to reach much further towards the interior, and embrace Van Diemen's Land and a considerable stretch of the southern coast to the eastward. It remains yet to be observed whether even the small surface explored of the east side of the Great Island is subject to earthquakes or not. Abyssinia too, though not affording the record of a single earthquake, is too closely united with the seismic region of Arabia and the mouth of the Red Sea, to be probably perpetually in repose.

There are great *untinted spaces* upon our map. The northern and southern polar regions, immense tracts in North America and in Northern and East Central Asia; surfaces in South America nearly as large as all Central Europe; the whole African continent except the northern edge and southern point; nearly the whole of Australia, and almost the whole of the bed of the great ocean, are perfectly unstudied and unknown to us, as respects their seismic condition. They appear white, and hence free from earthquake, upon the map, but only because there are no observations.

Future researches will probably, however, show that all these vast tracts of land are traversed by earthquake-bands presenting generally the features that we recognize elsewhere, and that the ocean-bed, far from the continents, although always much less disturbed, for equal extent of surface, than the land, and especially than the coast, of the great oceans, is also traversed by earthquake-bands continuous with and tracing out their shallowest contours.

Had navigation been, in times past, as frequent and constant in the Pacific and Southern Indian oceans as it has been in the narrower Atlantic, especially north of the equator, the former would most probably present, over very much of their vast surfaces, light seismic tints such as almost the whole Atlantic presents, included as it is within the range of movements transmitted from both its western and eastern borders, and also from the foci within its bosom, connected by seismic lines so closely adjacent, *i. e.* with sub-basins so comparatively small in area.

Imperfect as are our observations on land, they are much more so upon the surface of the great ocean that covers three-fourths of our globe; so that only a very rude approximation, and from very partial data, can be made towards the solution of the question, What is the relation of seismic energy beneath the land and the ocean?

The result of Perrey's memoir 'On the Basin of the Atlantic,' (Dijon Mém.) assigns, for a period from 1430 to 1847, or 417 years, a total of only about 140 shocks (or three shocks per annum) observed over an area of about 24 millions of square miles. If we contrast this with the only tolerably well-observed portion of the dry land, the great European area, we find thereon at the least 40 shocks per annum observed upon an area of 1,720,000 square miles, or (allowing for regions included, but never observed), say, 1,500,000 square miles. There occurs therefore annually in the Atlantic

basin one shock for every 8,000,000 square miles of surface, and, in the European area, one shock for every 57,500 square miles of surface; so that within these large areas the seismic energy beneath the land is to that beneath the ocean-floor as 213 : 1 nearly. The annual number of observed European earthquakes is certainly below the actual number that occur; and although the Atlantic is the only oceanic surface of our globe over which there can be a pretence even to correct observation, yet its recorded numbers must be very far indeed below the truth, and immeasurably lower in proportion than for Europe. Making, however, every allowance for imperfect information in the pelagic area, the disparity of relative numbers is such, as to warrant our estimating, with some confidence, that the seismic energy is manifested with much greater power for equal areas upon the dry land than upon the ocean-bed.

Should it ultimately prove a fact, as rendered probable from the beautiful investigations of Darwin, that there are great areas of gradual subsidence now in motion beneath the Pacific, it may still happen (though it is not probable) that seismic or even volcanic bands may traverse such areas of subsidence, without materially affecting their general downward movement. Although many portions of the earth's surface now show evidences of vertical instability, either slowly, or *per saltum* occasionally, rising or sinking, these effects are all comparatively insignificant in extent. The great formative forces, whatever they were, upon which the elevated land of the great continents and the depression of the ocean-beds depended, have ceased sensibly to act. The function of the volcano and the earthquake in the existing cosmos is not creative, but simply preservative; and vast as they appear to eye and sense, their effects are very small in relation to the totality of the great terrestrial machine.

If, however, such large areas of oceanic subsidence as have been supposed really exist, they will most probably be found situated almost centrally within the oceanic sub-basins, and hence surrounded but not traversed by seismic bands.

There is one fact, which is shown by the relative positions, upon this map, of the greatest volcanic areas upon our globe (and these the most active) and of the blue-tinted areas of probable subsidence, that is worthy of fixing our attention.

It will be observed that the blue bands of probable subsidence are tolerably adjacent to the greatest seats of volcanic activity, and that the latter generally have subsiding areas at more than one side. Thus, in the Pacific, the blue band is along the great volcanic girdle from C. lebes to New Zealand, and thence stretches between (and at one point *may* cut through) the line of suboceanic volcanic girdles, from the New Hebrides to the Marquesas.

Again, the great volcanic horse-shoe girdle of Sumbava is between the blue (subsiding) area in the China Sea north of Borneo, and the blue coral bands north of Australia, which whole continent, or at least its western and northern parts, may probably be subsiding also. Lastly, in the north we have Iceland and its volcanic system, between the sinking coasts of Greenland and those of the Baltic.

If we admit, then, as certain, that these vast tracts are subsiding, we can scarcely withhold our belief that the subsidences are due to and are the equivalent in bulk of the solid ejecta and exhalations of these various great volcanic areas respectively.

The assumed area and extent of subsidence of those supposed subsiding tracts are, however, I apprehend, greatly overrated; this, however, is not the place to pursue their consideration.

From all that has preceded (here and in former Reports), it is plain that

nothing like one or more great general horizontal directions of seismic movement can exist upon any very large tracts of the earth's surface ; and that if it be even possible to assign, as proposed by M. Perrey, a general horizontal component for limited areas, the method does not admit of extension. The normal type of an elastic wave in a homogeneous solid, is only varied, so far as observation yet goes, by the accidents principally of material and surface, whether the area of disturbance be great or small.

Nor does the seismic intensity in any part of the world, so far as originating impulse is concerned, seem connected with the superficial character, to the greatest known depth, of the geologic formations, beyond what connexion is necessarily inferential from the seismic bands (where they exist) following, on the whole, the lines of mountains and ridges that separate the surface-basins of the earth, whether volcanic or not. While, therefore, the seismic waves diverge, from axial lines that are generally of the older rock formations, and often of crystalline igneous rocks or actively volcanic, they penetrate thence formations of every age and sort, even to plains of the most recent post-pleistocene clays, sands, and gravels ; and occasionally, by the secondary efforts of great shocks, these loose materials are shaken or caused to slip and gather up into new forms (as in the Ullah Bund at the mouths of the Indus, &c.), and so the earthquake has come to be mistakenly viewed as a direct agent of elevation. Its true cosmical function is the very opposite : it is part of the dislocating, degrading, and levelling machinery of the *surface* of our globe, while the part of the volcano is restoration and renewal. Both are, however, not creative but conservative (strange as it may sound), and suited to the period of man's appearance and possession of the earth.

Viewing as a whole, and in a single glance, the distribution of seismic energy over the whole globe, it presents (so far as we yet know) a vast loop or band round the Pacific, a more broken and irregular one around the Atlantic, with subdividing bands and a vast broad band stretching across Europe and Asia, and uniting them.

Thus an apparent preponderance of seismic surface seems to lie about the temperate and torrid zones, both northern and southern ; but extended observation is yet required in high latitudes, and particularly in the Antarctic ones, before we dare venture to affirm that there is a real preponderance extending over any one or more great climatic bands or zones of the earth's surface.

The following are perhaps the most general conclusions that are at present justifiable :—

- 1st. The superficial distribution of seismic influence over existing terrestrial space does not follow the law of distribution in historic time ; it is not one of uniformity. There is this resemblance, which, however, is not a true analogy,—that as the distribution is paroxysmal in time, so it is local in space.
- 2nd. The normal type of superficial distribution is that of bands of variable and of great breadth, with sensible seismic influence extending from 5° to 15° in width transversely.
- 3rd. These bands very generally follow the lines of elevation which mark and divide the great oceanic or terr-oceanic basins (saucers) of the earth's surface.
- 4th. And in so far as these are frequently the lines of mountain-chains, and these latter those of volcanic vents, so the seismic bands are found to follow them likewise.
- 5th. Although the sensible influence is generally limited to the average

width of the seismic band, paroxysmal efforts are occasionally propagated to great superficial distances beyond it.

6th. The sensible width of the seismic band depends upon the energy developed, and upon the accidental geologic and topographic conditions at each point along its entire length.

7th. Seismic energy may become sensible at any point of the earth's surface, its efforts being, however, greater and more frequent as the great volcanic lines of activity are approached.

8th. The surfaces of minimum or of no known disturbance, are the central areas of great oceanic or terr-oceanic basins or saucers, and the greater islands existing in shallow seas.

The fact that certain low-lying river-basins, such as the Mississippi and the Ganges, are the seats of earthquake disturbance, does not conflict with the last proposition. In these cases, the impulse is propagated into the plain from the band of the bounding ridges; and when these are very large in relation to the basin, the breadth of the seismic band may overlap its whole surface,—as for example in the basin of the Ganges, where the seismic banks of the Himalaya and Vindhya mountains cover the whole plain of Northern India.



We have thus extracted all the information that our Catalogue, or indeed any further cataloguing of earthquakes, seems capable of giving us; future research must take a more distinctly physical character. I therefore proceed to some observations upon instrumental seismometry and the construction of seismometers, upon which our future progress must much depend.

Twelve years ago, at the period of the author's paper (*Trans. R. I. Acad.* vol. xxi. 1846) "On the Dynamics of Earthquakes," the construction of seismometric instruments appeared a comparatively easy matter; there did not seem to be much difficulty in producing even a self-registering instrument that should give every element of the earth-wave at the surface, whose normal velocity of propagation was then assumed to be extremely great, to approximate to that theoretically due to the elasticity of solid rocky media, and not to vary very materially in direction of propagation during its transit from the origin, to any distant point of the earth's surface.

It is only at a very recent period that experiments and observations as to the actual phenomena, the velocity and direction of shock, &c. have begun to show the real difficulties of the subject; and as these are apparently not very generally recognized, I propose pointing some of them out here, prior to indicating the limits within which for the present, it appears to me, we must be content to restrict our seismometric aims and instruments, and describing what form of instrument, and in what localities placed, would appear, with our existing knowledge, the best to give us some information—approximate only, and incomplete without doubt, but yet such as can be made a safe basis for a future higher step with more refined and comprehensive instruments. I shall avoid as much as possible (as out of place in this Report) any mathematical treatment of the subject. The antecedent history of seismometers is in brief as follows:—

All the instruments hitherto devised or set up may be divided into two great classes:—1. *observational*, those whose motions must be observed and recorded after each shock; 2. *self-registering*, which record their own past movements however repeated, and admit of their observation at any subsequent period within certain limits. Each of these classes is again divided into two sorts:—*a.* instruments dependent upon the movements by displace-

ment of liquids; *b.* those dependent upon the partial displacements of solids. Of the first class, there have been—

- 1 (*a*). That of Cacciatore of Palermo, long in use in Sicily. It consists of a wooden circular dish about 10 in. diameter, placed horizontally and filled with mercury to the brim-level of eight notches that face the cardinal points and the bisecting rhumbs between, and are cut down through the lip of the dish, equally in width and depth all round. Beneath each such notch a small cup is placed, to receive such mercury as may be thrown out of each notch by an oscillatory displacement of the main mass of mercury, due to a general oscillation of the whole system. Either the volume or the weight of mercury found in each cup is supposed to measure the value of the displacement, and hence of the shock in its direction in azimuth.
- 2 (*a*). The wooden or other bowl of molasses, or other such viscid liquid, suggested for use by Mr. Babbage.
- 3 (*a*). A cylindric tub with chalked or whitewashed sides, and partially filled with some heavy and permanently coloured liquid of deep tint. (Mallet, Admiralty Manual, sect. vii. p. 218.)
- 4 (*a*). Tubes partially filled with mercury, -shaped, with the horizontal and open limbs directed to the cardinal points, for the horizontal component of shock; and -shaped for the vertical component,—both sets being provided with marking indices, to show previous displacement of the mercury. (Mallet, Admiralty Manual, sect. vii. p. 214.)
- 5 (*b*). The oldest, probably, of seismometers, long set up in Italy and southern Europe. A pendulum, free to move in any direction, carries below the bob a stile partly immersed in a stratum of dry fine sand spread to uniform thickness over the concave surface of a circular dish placed beneath, marked to the cardinal points, whose centre is beneath the point of suspension of the pendulum when at rest, and whose concavity is that of a spherical segment of a radius equal to the length of the pendulum and stile, plus rather more than the depth of the stratum of sand. It was supposed that the stile would mark a right line when seen in a plane vertical to the sand-bed, and in the direction of the shock.
- 6 (*b*). The inverted pendulum, held vertical when at rest by its forming part of a spring at the base (like the watchmakers' noddie), armed with a chalk tracer or pencil above the bob, marking a line or lines upon the concave lower surface of a dish in form like that of the preceding. This was understood to be one of the instruments adopted by the observers of the repeated shocks of Comrie, &c., and the invention, in its improved form, of Prof. J. Forbes. (Phil. Trans. Edin. vol. xv. part 1; Trans. Brit. Ass. 1841–42.)
- 7 (*b*). The inverted spring and ratchet pendulum seismometer, proposed in 1854 by Robert F. Budge, Esq. of Valparaiso, in a letter (12th March 1854) to Mr. Patterson of Belfast, and obligingly forwarded by him to the author. Four cylindrical or square rods of spring steel, each carrying a spherical bob (an iron shot) at top, are fixed vertically. Each is provided with a ratchet, finely cut upon the rod, and a pall, the planes of motion of the four palls passing through the cardinal points, so that each spring pendulum is free to make *one semioscillation* only in its own direction, or that of its ratchet and pall, and be arrested there by the latter until its position of displacement be observed and it be released. Thus, in the figure (2), *p W* is the spring pendulum (which, it may be remarked, would be better a flat ribbon of spring steel,

the broad dimension being transverse to the arc of vibration, thus either round or square as proposed), W the bob, r the ratchet and pall. If we suppose this to be in the N. and S. vertical plane, a shock from the S. may bring the pendulum into the position $p m$, when the pall will fall into that $r n$, and detain the instrument in its new position until the angle $n p W$ can be observed.

The main object proposed by the author of this modification of the inverted pendulum was, that the observable movement of the instrument should be as nearly as possible that of the horizontal component of shock, without being perplexed with indications due to subsequent abnormal motions of the instrument.



- 8 (b). The pendulum seismometer of Santi. Two pendula suspended close to the faces of two walls, ranging in vertical planes traversing through the cardinal points, are free to oscillate in those planes only. Each is provided with a chalk tracer, which marks the arc of oscillation N. and S. or E. and W., or *vice versa* as to either, upon the prepared face of the wall. This has been long in use in Italy. The length of the horizontal chord of the arc traced is assumed to be equal to the horizontal component of shock in the direction marked, and intermediate movements are to be obtained from comparison of the lengths of both cardinal chords by the known laws of compounded motions.
- 9 (b). A vertical inverted spring pendulum, formed of an elastic rod (wood or cane), with bobs of iron shot, is fixed within a hoop, with certain extemporaneous means of marking its oscillations in any plane, or more than one, for horizontal component. Such pendula, fixed horizontally in a wall, or in two N. and S. and E. and W. walls, may be used for vertical element, or a shot hung from a spiral spring of wire (Mallet, Admiralty Manual, sect. vii. p. 217, 218.); these were intended for extemporaneous use. The spiral spring arrangement has had several different proposers, some anterior to the above.

Such are the principal instruments of the first class, used or proposed, in addition to which may be noticed the balanced circular dish, or wheel-formed seismometer, suggested, I believe, by Professor J. Forbes and Col. James, R.E.,—a disk of cast-iron or other metal with a heavy rim, upon a central point of suspension slightly above the centre of gravity, and provided with a central tracing-stile, either above or below. The sensibility and power of horizontal recovery or stability of this instrument are nearly identical with those of the common balance. It is liable to all the objections that apply to pendula, whose properties in oscillation it still partakes of; and it is difficult to see any one special advantage offered by it.

Of the second class, or self-registering seismometers, the number is much more limited.

- 1 (a). The first completely self-registering seismometer proposed, the author believes to have been that invented by himself, an account of which

was read to the Royal Irish Academy in June 1846 (Trans. R. I. A., xxi. p. 107). It consists essentially of five fluid pendula,—glass tubes, partially filled with mercury, four for horizontal, and one for vertical elements of the shock. The displacement of the mercurial columns breaks contact, in an otherwise closed galvanic circuit, which, acting upon some simple contrivances, cause a pencil to trace a line upon ruled paper, whose length is proportionate to the time that contact remains broken, or to the amplitude and altitude of the earth-wave. The ruled paper, placed upon a cylinder, is maintained in motion by a clock; the position of the commencement of the pencil line traced on the moving paper, therefore, gives the moment in time, of the arrival of the wave, or initial instant of shock. The displacement of the mercurial columns is dependent upon inertia, and on the relative mass of mercury in the adjacent limbs of each bent tube.

- 2 (a). Professor Palmieri, of Naples, has, some time since, constructed an instrument, in point of general principle, very similar to the preceding, and which has been at work, as he informs me, with satisfactory results, at the Royal Meteorological Observatory upon Vesuvius, and for a considerable period. His instrument consists of two distinct systems, one for vertical, the other for horizontal, or rather undulatory movements. The former consists of a clock, constantly going, and registering *date* and *time*. A galvanic circuit, which includes an electro-magnet, remains always *unclosed*, except at the instant of the arrival of a vertical movement of the whole instrument, when one pole of copper or platinum wire, held suspended from a heavy bob at the lower end of a spiral spring—as in 9 (b), last sentence—close over the surface of a mercurial cup (the other pole), drops by inertia, and making good the contact, establishes the electro-magnet's action, and by it stops the clock and rings a bell. The *range* of vertical movement is, I believe, deduced from the direct motion of this contact-maker.

The system for horizontal (?) or undulatory movements consists of a similar clock and galvanic arrangement, and of four U-shaped glass tubes, open at both ends, and containing equal vertical columns of mercury. The vertical planes of two of these U-tubes are N. and S. and E. and W.; those of the other two in intermediate rhumbs. Close *above*, but not in contact with, the mercurial surface in one limb of each tube, is held suspended a platinum pole, the mercury itself being the other pole of the open circuit. Upon the surface of the mercury in the opposite limb a small float rests, connected by a silk cord over a pulley in a vertical plane, with a little counterpoise, slightly heavier than the float. If, now, such a movement be given to any one or more of these U-tubes as shall *kant it over or throw it out of plumb*, and so alter the relative levels of the opposite surfaces of mercury in the two limbs of the tube, the U-tube that shall incline *towards* the limb that contains the platinum galvanic pole will then make contact, and at the moment of doing so will stop the clock and ring a bell as before.

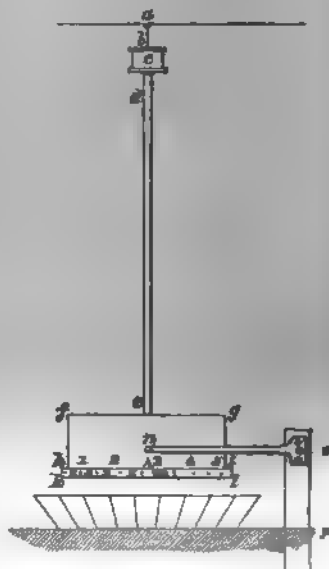
The amount of displacement as to level of the two surfaces of mercury in the opposite limbs will be made observable by the distance to which the small float shall be found elevated above the surface of the mercury in the opposite limb. A description of this instrument has been given, but without a figure, in De la Rive's

'Treatise on Electricity and its Applications,' English edition, vol. iii. p. 508*.

- 3 (b). The last self-registering instrument to be noticed is that of Herr Kreil of Vienna, of which an account appeared in 1855. This ingenious and simple instrument can hardly be made intelligible more briefly than in the author's own words, which I translate (with the addition of a word or two) from the 'Sitzungsberichte der Kais. Akad. d. Wissensch.' Band. xv. p. 111, Heft for March 1855:—

"A good seismometer is a desideratum still to be devoutly wished for. It should not only show the commencement of the stronger, but also of the weaker shocks, as well as their duration, direction, and strength,—a task which is too great for a self-registering apparatus. Therefore every idea towards the improvement of such instruments must be welcome; and on this account I venture to bring forward the following design (fig. 3). Let de be a rod of wood or metal suspended at a , which at d is fastened to the elastic spring c , like the pendulum of a clock, and therefore can swing in the plane of this spring in a vertical direction. Let ab be a second spring upon the first vertical one, which permits the bar of the pendulum, de , to swing in the plane of the spring c , i.e. at right angles to the former vertical plane. The bar de and the weight fastened to it can therefore swing in every direction, without its being permitted to turn on its own axis of vertical length, and as if there were but a thread or thin wire at b . The cylinder $fghi$ contains clockwork, which obliges it to turn round upon the bar of the pendulum (as its perpendicular axis fixed with reference to rotation) once in 24 hours. It is covered with paper or other material, which can be marked on without great pressure. It contains on the lower edge the numbers of the hours, which can move behind an index m , fastened to the plate kl , which is fixed to the axis of the pendulum. Upon a neighbouring pin, op , is an elastic and thin arm of brass, on , which carries a pencil at n , which, by means of a screw (spring?), can be pressed against the cylinder and removed from it. It is in firm contact with this, and marks upon it an uninterrupted line so long as the pendulum remains at rest; if, however, this begins to swing, in consequence of the whole system being shaken, this line will be broken, and strokes produced which will have a horizontal direction if the pendulum swings in the plane of no , but will be perpendicular and crossways if swinging in the plane perpendicular to no . The force and length of

Fig. 3.



* Since this report was commenced, I have myself had the advantage of seeing this instrument, and conversing with its distinguished inventor, as to its principles and construction. Prof. Palmieri informed me that it had been arrested by the celebrated shock of 16th December 1857, and had given indications that he deemed satisfactory. [R. M., May 1858.]

this stroke will give an approximation to the strength of the shocks. The middle of the stroke, or, if they are vertical, the end of the uninterrupted line, gives the time of the commencement of the shock. The strength and direction of the shocks may also be approximated if the (as respects rotation) fixed plate *h i k l* have an annular recess, filled with quicksilver until its surface reaches the holes *s s s*, made in the cylindrical sides. At the first motion of the pendulum, the quicksilver will be shed out through these holes into a dish divided into the same number of compartments as there are holes, like those already in use in many existing instruments of this kind (Cacciatores)".

Such are the chief seismometers hitherto proposed. They all involve in some form the principle either of the solid or of the fluid pendulum, the latter term being applied to the oscillations of liquids in tubes or other such vessels ; and have disadvantages, both theoretic and practical or constructive, which render their indications inaccurate.

Every pendulum seismometer has a time of oscillation due to its length, which in the case of the solid pendulum is

$$T = \pi \sqrt{\frac{l}{g}},$$

and in the case of the oscillating liquid

$$T = \pi \sqrt{\frac{0.5l}{g}}, -$$

l being the length of the pendulum and of the oscillating column of liquid respectively ; but if *P* = the period of the earth-wave or shock, then whenever *T* = *P*, or *n* × *P*, or $\frac{P}{n}$, the indication of the instrument will be in excess of the horizontal component of the wave's motion ; when, on the contrary, *T* represents no function of *P*, it may be much less than it.

The amount of error depends also upon the velocity of movement of the horizontal component of the wave. If this be considerable, the solid pendulum, whether hanging or inverted, acted on by gravity or elasticity, is at the first moment left behind ; as the rod becomes more oblique, the pendulum is *dragged* along, and acquires a velocity (in a direction which approaches to horizontal) greater than that due to the arc through which the pendulum has fallen in the time. At the end of the wave's forward movement, then, the pendulum is thrown forward too far ; and at the end of the return movement of the wave, it moves beyond the range of the latter, by a small arc due to its proper motion. This objection applies, though with less cogency, to the fluid pendula, and in their case to both the vertical and horizontal components of the wave.

These discrepancies of indication will vary whenever the velocity and dimensions of the earth-wave become altered ; and as, for the same instrument, *T* varies with $\sin^2 \lambda$ (λ being the latitude), it is obvious that even two perfectly similar instruments at stations north and south of each other, will not give strictly comparable results for the same earth-wave.

These are but examples of one or two points of theoretic difficulty, to which others might be added, and which affect these instruments principally as indicators of the dimensions of the earth-wave. Some of these theoretic disturbances may be eliminated by calculation from the results ; but there are also some apparently insuperable difficulties, of a practical or constructive nature, which affect all solid pendula as reliable indicators even

of the direction of surface-transit (horizontal component) of the earth-wave. However finely suspended the pendulum—if acted on by gravity only, or, however constructed if by elasticity or by elasticity and gravity, it is found impracticable to produce an instrument that shall make even the second half of its very first complete vibration strictly in the plane of the original disturbance, i. e. in that of the wave's transit. If, for example, any one of the

Fig. 4.



instruments 5 (b), 6 (b), or 7 (b), be caused to make a semivibration by a movement of the nature of one horizontal jerk, and strictly in one vertical plane *ab* (fig. 4), the trace made will in most instances be found thus; *cd*, the first semivibration, is made sensibly in the plane of movement, but the returning complete vibration *de*, is found diverging from it through a sensible angle *cde*. If the vibration of the instrument be suffered to continue, its trace rapidly becomes an extremely elongated ellipse, whose eccentricity constantly diminishes, as well as the actual dimensions of both its axes, until the instrument comes to rest, after tracing thus a mass of elliptic spirals, from which nothing certain can be gathered as to direction in some instances—in which, at best, it is only possible to arrive at a probable direction of originating impulse, by drawing a mean major axis through all these closed curves.

Constructively, this evil arises not only from the nature of the suspension, if a pendulum of gravity, or, if one of elasticity, from the form, material, &c. of the suspending or supporting spring; but also, in both sorts, from the fact that it is practically impossible that the point of suspension (or, in the spring, its centre of resistance), the centre of oscillation, and the resultant of the various opposing forces of the stile or tracing-point, shall lie in one vertical plane, and that that plane shall always coincide with that of the wave's movement; and hence lateral divergence of the pendulum and elliptic spiral oscillation. But it is also partly due to the nature of the earth-wave motion itself, which is never a purely normal one, but always more or less disturbed by small transversals; so that the initial movement impressed upon the pendulum is really not exactly that of the wave's transit. Before entering further, however, upon the subject of the actual perturbations of the superficial earth-wave, as now known, and their effects in relation to seismometers, some remarks may be advisable as to the special objections which I have either observed or experimentally ascertained in respect to each particular arrangement of the seismometers already described.

- 1 (a). The Cacciatore mercurial dish.—If the earth-wave emerge with a considerable angle from the horizon, and large velocity, the mercury first surges up at the side of the dish towards which the earth-wave is in transit, and in the direction opposite to its motion; it then, after spilling out some of the mercury, commences its return oscillation, moving in the same direction as the earth-wave, and spills out another portion at the opposite side of the dish. The sum of the weights so spilled out, taken at either side of a diameter transverse to the earth-wave's vertical plane of transit, will vary with every change in the angle of emergence, or in the velocity or in the dimensions

of the earth-wave. Small transversal vibrations, arriving almost along with the earth-wave, as well as the effects of the form of the dish, and of its delivering-spouts or adjutages, disturb the initial simple surge of the mercury across the diameter of the dish, and produce reflected and other secondary surge movements of the mercury, which traverse round the circumference of the dish, and spill out more mercury in irregular gulps. The final result is, that no reliance whatever can be placed upon its final indication, as to the plane of the earth-wave transit having passed through the centre of gravity of that semicircle of cups which are found to contain the most mercury. The result is not materially different if the line of transit of the earth-wave be perfectly horizontal. This instrument gives no information whatever beyond a most uncertain approximation to the direction of the horizontal component of the earth-wave transit.

- 2 (a). The same objections generally apply to this form of instrument, and one in addition, viz. that a viscid liquid like molasses must always give indications short of the truth as to excursion in the dish due to any given shock, and the more so as it is more tenacious and approaches nearer to a solid; and as we have no correct means of measuring viscosity, even assuming it constant for the same liquid, nor any certainty that the specific gravity of such liquids remains constant (it is certain *molasses* will not remain of the same density in any climate for any considerable length of time), so observations made through their means at different times and places can never be comparable.
- 3 (a). The same objections that apply to 1 (a) apply to the tub of coloured water, but in a mitigated degree, the diameter being large, the volume and depth of the liquid great, and the cylindrical sides of the tub free from any apertures or inequalities. The initial surge gives a much more distinct indication of direction than in either of the preceding instruments; and it does not very frequently happen that a diameter may not be found approximating, with tolerable certainty, to the plane of earth-wave transit. But in cases where the normal wave is preceded or accompanied by very appreciable transversals, those *violent tremors* that are now known as the frequent accompaniments of the actual shock—the water-tub seismometer will give no indication, or an uncertain one, unless watched and remarked as to transit-direction at the instant of the occurrence of the shock.
- 4 (a). Tubes partially filled with mercury give almost unobjectionable indications as to *direction* of transit. Their evils are too great delicacy or sensitiveness, for the observation of that class of earthquakes of mean power, which are the most important to be studied, and by which they are completely deranged occasionally, while they are continually being disturbed in such a seismic region by small tremulous movements that are unimportant to notice. As respects their indications of velocity and dimensions of the wave, they are liable to the objections already noticed as applicable to all pendula.
- 5 (b) and 6 (b). The main disadvantages of these constructions, viz. the suspended and the inverted solid pendulum have been already pointed out; it may be added here, however, that with the inverted pendulum of Forbes, the supporting spring is more or less crippled down, by a sharp vertically (or nearly vertically) emergent shock, which gives a lateral movement (greater or less) to the pendulum, as though

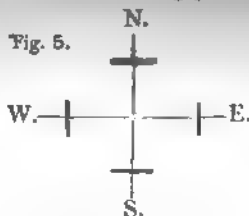
from a horizontal originating motion, so that the instrument gives in such cases an absolutely false indication.

- 7 (b). Mr. Budge's inverted spring pendulum, restrained to a single semi-oscillation in one plane, offers some decisive advantages over all other forms hitherto proposed of the pendulum seismometer. The whole length of the pendulum is elastic; and the rod being light the whole weight by whose inertia it is bent may be considered as in the ball or bob. If Σ be the moment of resilience of the rod, and the deflection be not very great, the angle $\omega p n = \theta$, then—

$$\Sigma(L \tan \theta - b) = \frac{FL^3}{3},$$

L being the length, and b the horizontal ordinate of deflection of the pendulum. It is plain that although, like every other elastic rod, this will have a time of vibration of its own, and be therefore liable to part of the theoretic objections made to the simple pendulum, on the same account, this form of pendulum will be "brought up" much more nearly within the true limits of the earth-wave amplitude in its horizontal component.

Perhaps the ratchet and pawl may not be the best mode, practically, of arresting its movement at the end of its first semioscillation, which sufficient delicacy, and other methods are obvious that may be applicable, but if the elastic rod be a flat plate of sufficient breadth in relation to its thickness, and each rod or pendulum (of the four) be so placed, with reference to the cardinal points, that its broad dimension shall be transverse to its normal plane of flexure, it is then obvious that practically we may neglect any flexion of the rod in any way, the four rods in section being posited thus (fig. 5)—



and that thus we obtain a flexure, for each pendulum, practically limited to its own vertical plane of oscillation, and so can obtain, for any intermediate line of wave-transit between the cardinal points, a good approximate resultant direction from the two adjacent component deflexions. Perhaps a flat ribbon like rod of tempered steel, whose section should be a rectangle, with sides having the proportion of about 30 : 1, would be better than an elastic wooden lath; and either case, it is probable that a tape or silk ribbon, fastened at the side r , and passing with friction through a small horizontal slot in the elastic rod, so as to be stretched by its deflexion and pulled through the slot, would be the best and simplest mode of registering the deflection, at the angle θ .

While this appears to me the best of the solid-pendulum arrangements, I do not wish to be understood as recommending any one of the class.

- 8 (b). Santi's arrangement is of course subject to the objections made to the pendula. It possesses some advantage in separation of the results

different azimuths, and therein in clearness of indication; but it also has special disadvantages of its own. If, for example, the line of earth-wave transit be from S. to N., and the E. and W. pendulum be set up at the S. side of its own wall, it will tend to be thrown off or out from the wall by the shock; if placed on the N. side of its own wall, its friction will be increased on its suspensions, and tracing-point, by its being thrown in or pressed against the wall; and if the line of earth-wave transit be, say N.W. and S.E., both pendula will be either thrown out from or pressed in against their respective walls, according to which side of the N. and S. walls they be fixed at. This source of variable inaccuracy might perhaps be eliminated by a double set of pendula, viz. one at each of the opposite sides of the N. and S. and of the E. and W. walls, which would thus be oppositely affected (in excess and in defect) by this source of error.

- 9 (b). What has been already stated, with reference to errors common to all pendula, and the remarks made under 7 (b) as to the superiority of elastic over simple pendula, render it needless to enlarge on those which were only proposed as extemporaneous instruments, and for which they will be found convenient and useful, and not more inaccurate than much more elaborate ones.

Referring now to the second class, or self-regulating instruments,—the disadvantage of the one

- 2 (a), proposed by the author is of the same character as that of 4 (a) of the first class, viz. too delicate a sensitiveness to small tremulous shocks, which derange the composure of the instrument, without its giving decisive indications. The galvanic recording part of the apparatus was all that could be desired, and is of course applicable to other forms of instrument as respects the displacement portions. Indeed, apparatus identical in all its main characteristics has been since brought into successful and constant use by Professor Airy, Astronomer Royal, for the registration of astronomical and other kindred observations, and also by several experimenters abroad. An account of many such arrangements will be found in De la Rive's 'Treatise on Electricity.'
- 2 (a). The same remark, I think, may apply to Professor Palmieri's seismometer, with this addition: the movement of the mercury, equal columns of which are contained in the opposite legs of each U-shaped tube, depends in his instrument *wholly* upon the U-tube being *canted over* more or less in its own plane, so as to throw the legs of the tube out of plumb. This, Professor Palmieri (if I do not misunderstand him) considers an inevitable consequence of the transit of the earth-wave at the instrument, conceiving the earth's surface to suffer, in every case, such a sensible heaving undulation, as to rock the instrument upon it, like a ship upon a heavy ground-swell. I must confess to entertaining great doubts that, in the great majority of earthquakes, any such sensible undulation (enough, at least, to produce a sensible throwing out of plumb of the U-tubes) can occur, although I have no reason to doubt that, from its delicate sensitiveness, contact will be broken, and the instrument act in so far, by some of the violent jars or jerks that it may receive. This peculiarity constitutes, in fact, the essential difference in arrangement between the author's seismometer and Prof. Palmieri's. In the former the

mass of the mercury is in unequal columns in each tube, so that its displacement is dependent solely on inertia; it therefore sympathizes with the movement of the earth-wave, emergent in whatever way; in the latter, the correctness of indication of the instrument depends not at all on the inertia of the mercury, but simply upon the alteration of relative surface-level in the opposite legs of the U-tubes, when the latter are thrown more or less out of plumb by the supposed undulation of the earth's surface at the transit of the shock.

- 3 (b). Kreil's ingenious instrument is not devoid of some serious objections. It partakes of those common to all pendula; and these will be further perplexed when the annular dish *A i A l* is filled with mercury, which will form a second (fluid) attached pendulum with a time of oscillation of its own, and differing largely from that of the pendulum which suspends it. Very little value, however, can be attached to the indications to be afforded by the very small amount of mercury that can be caused to spill out, owing to the very small arc of oscillation that the whole instrument can be afforded to make by construction. The most serious objection, however, lies in the method of flexible suspension adopted for the whole pendulous part of the instrument, viz., by two *short* thin plates or ribbons of tempered steel, whose respective vertical planes are at right angles to each other, the object being to *allow of oscillation* in any direction, but *prevent rotation* upon the vertical axis. Whenever a somewhat energetic disturbance shall be given to a pendulum so suspended—so as to cause oscillation in a vertical plane, diagonal to the crossing planes of the two suspending ribbons, *torsion* of each of these arises, and violent twisting-movements (by jerks) of the pendulum itself result, producing sudden, jerking, rotatory oscillations of the bob (the cylinder containing the clockwork, &c.) round the axis of the pendulum. These must of course interfere with and derange any true results as indicated by the tracing-pencil, which must also record all such accidental moments, and probably derange the rate of the clock.

There does not appear, however, to be any insuperable difficulty in devising another mode of suspension for the instrument, that might at least remove this defect.

Such are some of the main objections to the seismometric instruments themselves, hitherto proposed. It remains to consider the difficulties introduced by the nature of the movements we require to observe and record with them, as they actually take place in nature. What we want to find is the true direction of emergence of the normal earth-wave, with its dimensions and velocity, at a given point upon the earth's surface. This, were the earth a perfectly homogeneous elastic solid, though much easier, would still be attended with grave difficulties; one of these, which must ever remain *instrumentally* insuperable, consists in the fact that the emergent wave on leaving the free outlying stratum of the earth's surface, differs both in dimensions and in velocity from the same wave in the previous parts of its deep transit. Future and more perfect knowledge of the laws of imperfectly elastic bodies in wave-transmission will, it may be expected, enable us to calculate the latter from the observed final part of the transit.

Far, however, from being homogeneous, every portion of our earth's crust that we are acquainted with consists of various "couches," or masses of materials, differing in elasticity, density, and degree of discontinuity, in the character, directions, and openness or closeness of the discontinuant fissures,

in wetness or dryness, in temperature, and in many other ways. Stratification and lamination, with their transverse master-joints, affect the elasticity of whole mountain-ranges and profound masses of the land, and cause it to differ in different directions.

The mass beneath our feet is very often not even approximately solid. Vast beds and cavernous recesses occur, empty, or filled more or less with water, sometimes with lava, ignited rock, and steam at enormous temperature and tension; and, for anything we as yet *know*, seismometry may require to deal with depths and masses where the solid has passed, with exalted temperature, into the imperfectly liquid state.

Again, the *surface* of our earth is everywhere more or less uneven, and, viewed over large areas, such as earthquake-transit is concerned with, is ribbed with rigid mountain-chains, often intersecting or abutting on each other, channeled by valleys, river-courses, deep estuaries, and bays, excavated into basin-shaped hollows often long and narrow, sometimes filled with unconformable rock or with loose and incoherent detrital material, and intersected to unknown depths by dykes, veins, and faults. The result of these differences and disturbances of internal structure and superficial features is to produce perturbations in the surface emergence of the earth wave, often of the most amazing and perplexing character; and it is not until the nature and extent of these have been realized to the mind, that we shall be enabled to choose the best form of seismometric observation, to determine upon the only proper sites for the establishment of instruments, and to see within what limits our first researches must be confined.

Let us notice, then, a few examples of striking surface-perturbation, of direction, of the great earth-wave, already on record.

Savi ('*Relazione di Fenomeni presentati dai Terremoti di Toscana, dell' Agosto 1846,*' p. 32-44) and Pilla ('*Istoria del Tremuoto che ha devastato paesi della Costa Toscana il dì 14 Agosto, 1846,*' p. 48-54) have both recorded examples of horizontal apparent movement of the earth-wave in directions orthogonal or even actually opposite to each other, and at points within very limited distances from each other, while, on the whole, there was no doubt of a ruling general direction of horizontal movement over the whole region. I can merely refer to their relations, as scarcely admitting of condensation intelligibly.

M. Perrey, in his '*Memoir on the Earthquakes of France, Belgium, and Holland*' (*Mém. Cour. de l'Acad. Roy. de Brux. tom. xviii.*), under date of 5th July, 1841, has recorded a still more remarkable instance of surface-perturbation, which the small map (Plate XII.) of the northern and part of the central region of France, with outlines of the departmental divisions, illustrates. Those departments in which this shock was felt are marked by numerals referring to the following table. The directions of the horizontal component of the shock, as observed at the several places named, are shown on the map by a short thick arrow. A few other places where the shock was felt, but direction not observed, are marked by a large dot, and the name referred to by a letter. A few large towns, and the general range of the hilly country (running mainly in a N.W. and S.E. direction) between the two great seats of disturbance, are marked in mainly as general guides of position to the eye. This earthquake was sufficiently powerful to disturb furniture, move objects visibly, and affect clocks, &c., and was variously reported to have lasted in different places from two or three, to ninety seconds of time.

Number on Map.	Department.	Locality	Direction of Horizontal Component.
1	Seine	City of Paris ...	N. E. to S. W. ; three shocks.
		Sèvres	W. to E. ; three shocks.
		Chevreuse	N. E. to S. W.
		Longjumeau, m. ...	Direction not given.
2.	Seine et Oise ...	Rambouillet	W. to E.
		Grignon	N. E. to S. W.
		Orsay	S. to N. ; seven shocks.
		Meulan	N. to S. ; three shocks.
3.	Loiret	Nogent	N. to S.
4.	Loire et Cher ...	Quincy	W. to E.
5.	Indre et Loire ...	Caumadré	N. to S.
6.	Indre	Laugé	S. to N.
		Le Blanc, n. ...	More than one shock ; direction not given.
7.	Cher	Bourges	Vertical (soulèvement) ; two shocks.
8.	Eure et Loire ...	Chartres, p.	One shock ; direction not given.
9.	Seine et Marne ..	Donnemarie	S. to N. ; three shocks.
10.	Eure	}	No record of the shock having been felt in either of these departments.
11.	Oise		
12.	Côte-d'Or	Bligny-sur-Orche.	Three shocks ; direction not given ; very severe.

Here, then, we have two very limited but separated earthquake districts—one around Paris, the other more widely spread around Tours—and a third to the S.W., stretching into Côte d'Or, in which we have the observed or horizontal direction of shocks from N. to S., from S. to N., from W. to E., and from N.E. to S.W., and in one place said to be vertical. In the Paris district the extreme distance apart of the places of observation does not exceed 30 English miles, the average being under 15 English miles.

In the Tours district the extremes are under 70 English miles apart, and the average distance under 30 miles. The central part of one region is not more than 150 miles from that of the other ; and neither district is more than about 70 miles distant from the axial line of the chain of hills that separates them, and in the prolongation of which to the S.W. the third district is widely spread, taking the general line of axial direction.

Making every abatement that imperfect observation can justify, there remains abundant proof, in this example, that even in places within view of each other as to distance, but situated over heterogeneous formations, and in a country of broken and irregular surface, the superficial direction of shock may present anomalies at first sight apparently admitting of no analysis, and in any case incapable of giving any direct information as to prevailing direction, or position of focus, by mere seismometric observations.

The third and last example we shall take from India, as one not devoid of a larger interest also. In the map (Plate XIV.) a very rude outline is given of the geological formations of India, in a merely seismic relation however, i.e. with reference to relative hardness, density, and elasticity of the rocky masses,—thus distinguishing them only into the six great divisions of crystalline or granitoid, old stratiform, secondary (from carboniferous to cretaceous), tertiaries, alluvial plains, and some igneous porphyries, diorites, &c. In the colouring of this I have to acknowledge the kind assistance afforded me by Professor Phillips. This map has been fully described in "Second Report on the Facts, &c." (Brit. Assoc. Trans. for 1851, p. 313 *et seq.*), where it should have appeared originally, but was, at a late moment, prevented by an accident connected with its completion. I shall therefore, referring the reader to the former report, merely notice here the facts as relating to seismometry.

The great earthquake of 1819, which extended its influence right across this peninsula from Calcutta to Cutch, and during which the Ullah Bund was elevated, and the Runn of Cutch submerged—the former a low mass of sand and clay seventy miles long, about fifteen miles wide, and elevated about 10 feet; and the latter an area of subsidence of about 2000 square miles—had a great general line of horizontal propagation of shock, as shown by the heavy red line, of nearly from W. to E., a few degrees to the S.E.; yet at Calcutta it was felt from N.E. to S.W., and at many places along this immense line—situated between the Aravulla and Vindhya chains of mountains, as for example at Rampura—the great shock was felt in directions quite transverse to the principal line.

So also the general line of horizontal direction of the great earthquake of 1833, whose origin was far beneath the Himalayas to the E. and N., had a great general direction about that shown by the long red arrow line. At Katmandu, in the mountains, the shocks were more directly E. to W., and also (reflected shocks probably) from the ranges to the N., which had a direction nearly N.E. to S.W., while in the great plain of the Ganges the observed directions were various, and, without a more complete knowledge of the geology and surface-configuration of the country, perfectly unanalysable, in some places N. to S., and at others, sixty miles off, from E. to W.

While we must regard many of these observations as deserving of little stress as to accuracy, enough remains to prove that perturbations in the main directions of emergence at the surface of the normal earth-wave, due to heterogeneity of structure in depth, and to inequality of surface, principally, are of such a nature, as to render a special choice of district necessary in attempting any seismometrical researches (even with perfect instruments) which have in view the determination of the position of the focus of disturbance. This choice, according to our present knowledge, must be determined by the following conditions:—

1. The whole surface-area of observation, and to as great a depth as possible, must be uniform in geological structure.

If of stratified rock, not greatly shattered and overthrown, but (viewed largely) level or rolling only. The harder and more dense and elastic the formations, the better, but neither intersected by long and great dykes, nor by igneous protrusions of magnitude, nor suddenly bounded by such formations.

2. The surface must not be broken up into deep gorges, and rocky ranges, and valleys. Seismometry, in a high and shattered mountainous country, can scarcely lead to any result but perplexity. If the surface be deeply alluvial all over, it is less objectionable than valley-basins, and pans of deep alluvium, with rocky ribs between them.
3. The size of the area chosen for observation must bear a relation to the force of the shocks experienced in it. *Moderate shocks are always best for observation, and, in large areas of the most uniform character of formation and surface, will give the most trustworthy indications.*
4. If several seismometers be set up in the area, they should be all placed on corresponding formations, either all on rock, or all on deep alluvium. The rock, when attainable, is always to be preferred. Three seismometers, at as many distant stations, will be generally found sufficient, if the object be chiefly to seek the focal situation and depth.

Having now cleared the way by stating the difficulties of seismometric observations, 1st, as respects the instruments themselves, 2nd, as respects

their local emplacement, it remains to describe the instruments that appear to me the best calculated for the attainment of the objects we can at present propose to ourselves in seismometry, and to point out how such may best be applied; as also some indirect methods of arriving at the most important and interesting primary result, that we are entitled to expect in the first instance from such researches, namely, an approximation to the actual depth of focus within the earth, from which earthquake-impulses are propagated to the surface.

Were it possible to construct a perfect seismometer, it should record simultaneously, 1st, the movements, both horizontal and vertical, of the elastic wave itself, viz., the excursion or amplitude, the altitude, and the maximum velocity in the coordinates x , y , and z ,— z being vertical; 2nd, the movements of translation of the "advancing form" or wave itself at its emergence upon the earth's surface, with the velocities in the corresponding coordinates x_1 , y_1 , and z_1 .

These involve alone twelve equations of condition; and we assume that the elastic medium (the earth) through which the wave is transmitted, is homogeneous, in density and elastic modulus; and that the final wave-movements, of the free outlying stratum at the surface, obey the same laws as do those of the successive "couches" beneath.

Generally, we must assume the elasticity perfect, and that the *vis viva* of any particle in motion, Δm , is determinable from its velocity at its position of equilibrium. From the general equation of wave-motion

$$v = a \cos \left(\frac{2\pi}{\lambda} (x - at) \right),$$

we have the velocity at any point where a^2 is the intensity, λ the amplitude, α the transit-rate or velocity of propagation, x the abscissa, and t the time.

At the position of equilibrium $v = a$, and the *vis viva* of the particle Δm during the whole undulation is $\Delta m a^2$, and proportionate to a^2 . The wave we must suppose emanating from a central point, and propagated outwards in all directions alike, in imaginary, concentric spherical "couches." The *vis viva* must remain constant during the whole propagation. The velocity of propagation α is also constant; and the mass of the medium in wave-motion at any moment of the translation is the same; so that, if r = the radius of any such spherical "couche," the work done in it by the wave is proportionate to $r^2 \times a^2$, and constant for the whole transit, a^2 being $\propto \alpha \frac{1}{r^2}$. As, therefore, the mass in simultaneous undulation is constant, the

thickness of each imaginary successive "couche" must decrease as r^2 ; and so the displacing power of the wave diminishes also as r^2 , and the work done by the wave within any such "couche" of determinate thickness = $\Sigma \frac{1}{2} \Delta m a^2$,—or M , being the mass in simultaneous undulation, = $\frac{1}{2} M a^2$.

The wave at its origination, starts in any radius, with one normal and two transversal vibrations, the separate determination of which would require a corresponding increase in the number of equations for x , y , and z , and in the recorded facts by the instrument. It is obvious, then, even with the utmost simplifications we can assume as to the molecular condition of the medium (the earth), that practically we must be content with a seismometer that shall record only some of the more important conditions of the earth-wave, and in such a manner as shall enable us, indirectly, to arrive at others. And in considering the relative importance of the several elements, the maximum velocity of the wave at its point of emergence upon the surface, with the

directions in x , y , and z , or the horizontal components (x and y) of the direction of motion and the vertical component z , will be found the most valuable.

These are determinable by one instrument only. By two or more such, at separate and moderately distant places, the velocity of propagation or transit-rate α may be found; and by combining the results obtained by both, in calculation, each may be made to check and control the other, and for a given seismic region (apart from serious perturbations of internal formation) we can obtain the point upon the surface, vertically above the origin of the wave, and approximate to the depth of the origin itself, or of the focus of disturbance, below the earth's surface.

One or other, of two distinct seismometric arrangements, may be adopted, both dependent upon similar principles,—the second being of a simpler and less expensive character, but not susceptible (as a *single* instrument) of indications as accurate as the first, yet, as respects applicability to determinations of *time* (as one of several, set up in a given seismic area), quite as exact.

I proceed to describe the construction of both, their principles and action.

The first instrument is exhibited in Pl. XV. figs. 1, 2 & 3. Fig. 1 is a lateral geometric elevation of the instrument, whose length is placed in the direction N. and S., as seen in plan in fig. 2,—a precisely similar instrument being placed at right angles of azimuth to it, or with its length E. and W. The same letters of reference apply to similar parts in all the figures. Fig. 2 represents both the N. and S. and E. and W. instruments as placed in position, ww being part of the external wooden shell or wall of the seismic observatory, which may best be always of wood, or such material, and circular in form.

In figs. 1 and 2, aa is a cast-iron tabular bar, whose upper surface is horizontal, and whose long parallel edges are either N. and S. or E. and W. It is attached to a rigid cylindrical vertical bar of wrought iron, bb , which passes freely, but without shake, through bored holes in the top and bottom collars of the heavy cast-iron frame cc , which is firmly bolted by its bottom flanch to the heavy stone floor of the observatory; or, if the latter can be so placed, to the natural solid rock when levelled to form its floor. Beneath the frame cc is a pit, pp , for convenience of access to the bottom of the instrument. Upon the vertical bar b , a collar is fixed of wrought iron, k , between which and the lower bored collar of the frame cc , a spiral spring, e , is placed, having its axis coincident with that of the bar b .

This spring sustains, when at rest, the weight of the bar and table aa , and of all resting upon it, and is so adjusted as to resistance, that such forces in the vertical direction, as it may be expected the instrument will be exposed to at any time, shall not be able to compress the spring to such an extent, as to bring the lower surface of the table aa , into contact with the top part of the frame cc . A vertical "feather," let into the bar b , prevents it, or its superior attachments, from altering their position with reference to the frame cc , by turning round the vertical axis of the bar b in its collar-bearings.

A small sliding index, not shown in the figure, also moves in a longitudinal groove at the opposite side of the bar b , and, being placed in contact with the top of the frame cc , when the whole is at rest, indicates the extent of any vertical depression of the bar b , and of its load, by compression of the spring e . A buffer collar of vulcanized india-rubber is placed at l , above the iron collar k , as a precaution against a jar, in case of the sudden removal of part of the load on aa by any accident.

Upon the upper side and centre of the length, of the tabular bar aa , is

cast a hollow quadrilateral prism, *g*, which will be called "*the block*," provided with four "lugs" to receive the pivot-screws *n, n, n, n*. The table *a a*, supports two similar cast-iron inclined planes *i, i*, having for their entire length the trough-shaped section as shown in fig. 3. These planes are fixed to the table *a a*, by the pivot-screws *n, n*, and by the adjusting-screws *m, m* beneath, so that by means of the latter, the inclination of either plane may be altered or fixed, being otherwise free to rotate in a vertical plane, within certain limits, round the pivot-screws *n, n*, so as to alter the angles of inclination.

Upon each of these inclined planes, is placed a large heavy ball, formed of a hollow sphere of hard gun-metal, of about 0·3 of an inch in thickness, truly spherical and polished outside, and filled up solid with lead. These balls are adjusted in diameter, to the breadth and form of the inclined planes (as in fig. 3), so as freely to roll along, with but two points of contact.

When the planes *i, i* are adjusted at equal inclinations, the balls *B, B*, rest at their lowest ends, and are laterally in contact with, and supported by, the hard wood stops *r, r*, driven (from outside inwards) through, and well-fitted in, corresponding rectangular horizontal "slots" in opposite sides of the block *g*,—the end of each wood stop being curved to fit the surface of the balls, in a horizontal great circle, and so that the plane of the stop passes through the centre of gravity of the ball. Through each wood stop there pass the *e*— and *e*+ extremities of a galvanic conducting-circuit of thick copper wires, placed at about an inch apart, where they pass parallel to each other, through the wood stop, with their extreme ends coinciding with the surface of the stop next the ball, and being amalgamated; so that while ever the ball reposes in contact with the wood stop, the galvanic circuit remains completed, *through the ball*, between the ends of the wires, but is broken the moment the ball is removed from contact with them.

For one complete seismometer there are two such instruments as have been thus described,—one placed, as in fig. 2, in a N. and S., and the other in an E. and W. direction, as respects their length, and having thus four inclined planes and balls, each with its own distinct galvanic circuit from one common battery. A clock placed in the observatory carries round a cylinder with ruled paper, and each of four pencil markers continues to describe an unbroken line thereon so long as the balls are in contact with the blocks (or wood stops and galvanic poles); but (by an arrangement precisely similar to that described for my fluid pendulum seismometer—*Trans. Roy. Irish Acad.* vol. xxi. p. 107) the moment any ball ceases to be in contact with the block, and for as long as it is so, the pencil is withdrawn, and leaves a break in the otherwise continuous line traced by the rotation of the paper. No part of this clockwork registering-arrangement is shown in the Plate, as several modifications of it are practicable, and no one in particular is essential to the principle of the seismometer before us.

To illustrate the mode of action of the instrument,—returning to fig. 1, suppose it to be the N. and S. one, and adjusted so that the bar *b* is truly vertical, the parallel sides of the inclined planes *i* and *i* truly *in directum*, their angles of inclination to the horizon the same. Then if the arrow *Q* represent the direction of emergence of an earthquake-wave (supposed here to be in the plane of the meridian, and from S. to N.), at the first instant that the wave reaches the instrument, the bar *b*, and table *a a*, with all they carry, will commence to descend and to compress the spring *e* by their inertia, with a velocity dependent upon the vertical component of the wave, which carries up the frame *c c* vertically. Also at the first instant of arrival of the wave, the ball *B*, in virtue of its inertia, will move off from the block

towards C_2 ; and *the instant of its departure, by breaking galvanic contact of the poles at its stop, marks that of the commencement of the shock.* But the whole instrument is carried forward by the horizontal component of the shock, and *then moves back again*; the ball B is therefore carried forward also, urged by the block at r , and is caused to roll up along the inclined plane a certain distance, say to C , where it comes to rest, and, reversing its motion, rolls back again by gravity, and returns to rest in contact with the block and galvanic poles of its own stop. *The ball which first moves, which we may call the Time Ball (as indicated in time by the pencil trace on the clock-cylinder paper), will always be that at the side from which the shock arrives.* We neglect any account of its subsequent motions. The other ball, which we may call the Element Ball, by its movements gives us the elements of the wave. The instrument records *the whole time* that it is out of contact with the block g , viz. that of its excursion up and down the inclined plane i . If, in place of the wave having emerged at some angle to the horizon from S. to N., it had come at the same or at any other angle of emergence between vertical and horizontal, in the reverse direction or from N. to S., then the action of the balls also would have been reversed, B becoming the Time Ball, and being *left behind*, and thus noting the moment of arrival of the wave; and B_2 being thrown up along the inclined plane i , giving its elements.

Again (referring to fig. 2), if the wave emerge at some azimuth between N. and S. and E. and W., suppose from the S.W., with any angle of emergence, then by the vertical component the springs of both the N.S. and E.W. instruments will be compressed (and nearly alike). The time balls B_2 of the N.S. and B_2 of the E.W. instruments will be left behind, as before, (and both at the same instant will break contact with the block); and the element balls B and B will be thrown forward upon their respective inclined planes, as before—to equal distances in the case of the exactly intermediate azimuth here supposed, but to unequal distances if this azimuth be more to the W. or to the S. The instrument records the simultaneous excursions of both balls B and B_2 , giving the total time (as before) that each ball is out of contact with its own block or stop; and if the direction of the wave-movement be reversed as respects the instrument (suppose, from some point of N.E. towards S.W.), then the respective movements and functions of the balls will also reverse themselves, B and B being left behind, and B_2 and B_2 thrown forward, &c.

The general size and strength of the instrument must be determined with reference to the degree of violence of the earthquake-shocks to be anticipated in the seismic region it is intended for. The very greatest, and the very smallest perceptible shocks, are alike unsuited for useful measurement. The dimensions of the instrument, as shown by the scale of the plate, are such as I consider fitted to ensure its functions, under the effects of those shocks of mean intensity (such for example, as those common in the Mediterranean basin, or in those of Hungary and Austria), and with moderate vertical angles of emergence, which are those best to observe in the existing state of our knowledge.

The most important points of precaution of a constructional character to be noticed are the following:—The balls should be of lead chiefly (the surface being formed, for hardness and smoothness, of gun-metal), to reduce their proper elasticity as much as possible. The inclination of the planes i , i must be small, probably never exceeding 15° , and the length and inclination so adjusted by experiment, to the maximum time of wave-oscillation in the district of observation, that the whole time of rolling up and down of the ball shall be considerably longer in duration. Their bearing-edges must be per-

fectly parallel and smooth; and the length of the planes must be such, as to make it highly improbable that any ball, in its excursion under shock, can reach the upper end. A wood stop is fixed at this point to arrest the ball, should it ever chance to reach it; and beyond this a stout net (like the purse of a billiard-table) may be fixed to a separate support (from the floor), to receive the ball, if upon an extraordinary occasion thrown out of the instrument.

It is assumed that any alternate alteration of the inclination, of the inclined planes i, i , by actual *surface-undulation*, carrying the whole instrument with it at the passage of the earth-wave, may be neglected, *i. e.* that, for example, a wave passing in a direction from S. to N. will not sensibly lift up the S. end (of the N. S. instrument) first, and then the N. end, and so first increase the inclination of the plane of B_2 and reduce that of B_1 , and then *vice versa*; and that whatever amount of *tilting* may thus occur will so *momentarily* affect the inclined planes, and in opposite directions, as not to interfere with the proposed movements of the balls.

This assumption is justified by the fact that the value of λ , the amplitude of the earth-wave in the normal, is always great in relation to its altitude, and in the case of oblique surface-emergence its horizontal component is of still greater length; so that the angle of slope of either face of the emergent wave with the horizon, is practically imperceptible in moderate shocks; and, further, any tilting that can occur takes place in opposite directions successively, so as nearly to compensate.

The vertical spring e must be delicate and sensitive, at the first instant of its compression, in proportion to the movement by inertia of the large mass that it carries, and its range, proportioned to the degree of steepness of emergence to be expected in the region of observation.

The whole vertical component is absorbed by this spring, and may be measured by its compression; but it is important that it shall give way sensitively, at the first moment of shock, in order that neither of the balls shall have any tendency to rise from the inclined planes that support them, and that its resilience shall not be too lively, so as not to produce rebound upon the restoration from compression. In certain seismic regions, where great steepness of emergence may be looked for, the vertical component will probably be best met by the depression of a conical float with the apex downward, fixed to the lower end of the bar $b b$, into a cylindrical vessel of water placed beneath the instrument; but this must be matter of experiment in such regions.

Were the whole instrument rigidly fixed to the ground, the latter as well as the materials of the instrument and ball highly elastic, and the velocity of emergence of the wave, in its vertical component, very great, it is obvious that time would not be afforded to the ball B , merely to *roll* up along the plane; it would be *thrown up* obliquely from it, and, describing a short trajectory, would fall back again upon the plane a little higher up, and then repeat a still shorter trajectory, or begin to roll upwards. But the ball is very inelastic, the rate of emergence of the wave is not very great in its vertical component; and the effect of this upon the instrument is spread over a still longer time by the interposition of the spring e .

If t = the time of the wave in seconds, $\frac{t}{2}$ will be nearly the instant of its maximum velocity v , in feet per second; thus the condition that shall ensure the ball B *rolling only*, and not being projected, is that the vertical component of v shall be less than

$$v = 32 \frac{t}{2}.$$

Unless, possibly, in the case of nearly vertical emergence, and from the most solid, and elastic crystalline rock, an ample latitude, t , is secured by the vertical spring.

We will now consider the movements of the element balls B and B₁ along the planes i, i , due to the horizontal component of motion, taking the two instruments (viz. the N. S. and E. W. seismometers) together, and assuming the horizontal component in any azimuth θ .

The blocks $g r$ (N. S.) and $g r$ (E. W.) move forward horizontally, and force on the balls B and B₁ before them until the instant, $\frac{t}{2}$, when the blocks have acquired their maximum velocities, with that of the wave, v ; the balls then part company from the blocks, and continue to move up along the respective inclined planes i, i , *sliding* for the first indefinitely short moment, and then, with a certain reduction of velocity due to the friction of the planes which produce the change of motion, *rolling* up along them. This initial sliding velocity will be

$$\begin{aligned} \text{For the ball B} \dots V &= v \sin \theta; \\ \text{For the ball B}_1 \dots V &= v \cos \theta. \end{aligned}$$

As soon as the sliding is converted into rolling motion by friction, these velocities will become

$$\frac{5}{7} v \sin \theta, \text{ and } \frac{5}{7} v \cos \theta.$$

Assuming that the change takes place almost instantly after the balls have begun to move from the blocks, *i. e.* that gravity has not had time perceptibly to alter the velocity up the plane, and neglecting the small effects, due to the elastic compression of the balls and blocks themselves, and also supposing that the *loss* of velocity of the ball, by conversion of its sliding into rolling motion by friction, is less than the diminution of velocity of the block (in the same short time), in returning from its maximum velocity to rest, the balls B and B₁ will be retarded by forces—

$$\text{For B} \dots \dots \dots \frac{5}{7} g \sin i,$$

$$\text{For B}_1 \dots \dots \dots \frac{5}{7} g \cos i,$$

i being the common inclination of the planes.

The ball B will therefore ascend upon its plane to a vertical height

$$\frac{\left(\frac{5}{7} v \sin \theta\right)^2}{\frac{10}{7} g} = \frac{5}{14} \frac{v^2}{g} \sin \theta = H;$$

we have therefore

$$v \sin \theta = \sqrt{\frac{14}{5} g H}.$$

So also the ball B₁ will ascend to the height

$$v \cos \theta = \sqrt{\frac{14}{5} g H'};$$

therefore

$$\tan \theta = \sqrt{\frac{H}{H'}}$$

and

$$V = \sqrt{\frac{14}{5}g(H-H')},$$

or, if $g=32$,

$$V = \sqrt{\frac{448}{5}(H-H')} = \sqrt{89.6(H-H')}.$$

This calculation assumes that the sliding is converted into rolling motion in an indefinitely short time, as it would in fact be, if the adhesion of the balls were large, and the inclination of the planes i small; but if the inclination of the latter be considerable, as 15° or upwards, a more exact determination is necessary.

Let, as before, the horizontal components of the velocity with which the balls begin to move, be $v \sin \theta$, and $v \cos \theta$, Z the velocity in the vertical, and the inclination of the planes i now large.

The initial velocity of ascent parallel to the planes will be,

$$\text{For the ball B} \dots\dots\dots v \sin \theta \cos i + Z \sin i,$$

and

$$\text{For the ball B}_1 \dots\dots\dots v \cos \theta \cos i + Z \sin i.$$

Let ϕ be the coefficient of frictional adhesion, of the balls to the plane; then they will ascend the planes to the heights,

$$B \dots H = \frac{(v \sin \theta \cos i + Z \sin i)^2}{2g} \cdot \frac{2 \tan i + 5\phi}{2 \tan i + 7\phi},$$

$$B_1 \dots H_1 = \frac{(v \cos \theta \cos i + Z \sin i)^2}{2g} \cdot \frac{2 \tan i + 5\phi}{2 \tan i + 7\phi}.$$

v and θ are known if the value of Z be given; and this may be ascertained experimentally from the compression of the vertical spring; or, as suggested by my friend Dr. Harte, to whom I have been indebted for these equations, a second pair of experimental inclined planes and balls might be used, with an inclination greater than i (say $2i$), from the observed movements upon which, two more equations could be got, the four equations being then more than enough, to determine v , Z and θ .

But the nature of the instrument is to record the values of H and H_1 , in terms of the whole time that the balls B and B_1 are out of contact with the block gr , i. e. of their rolling up, and down, the inclined planes,—this time being given, by the lacune in the pencil-trace made upon the revolving cylinder of paper carried along by the clock. The time of the balls' ascending to the highest point reached on the plane will be independent of adhesion; and calling it t , we have,

$$\text{For the ball B} \dots\dots\dots t = \frac{v \sin \theta \cos i + Z \sin i}{g \sin i};$$

$$\text{For the ball B}_1 \dots\dots\dots t_1 = \frac{v \cos \theta \cos i + Z \sin i}{g \sin i}.$$

The time of descent back to the starting-point, due to the heights H and H_1 , will be a little, but inappreciably, less than this.

The entire time of the double oscillation of each ball, therefore, or its movement up and down the plane, as recorded by the instrument, is,

$$\text{For B} \dots T = \frac{v \sin \theta \cos i + Z \sin i}{g \sin i} \left(1 + \sqrt{\frac{2 \tan i + 5\phi}{2 \tan i + 7\phi}} \right);$$

and

$$\text{For B}_1 \dots T = \frac{v \cos \theta \cos i + Z \sin i}{g \sin i} \left(1 + \sqrt{\frac{2 \tan i + 5\phi}{2 \tan i + 7\phi}} \right),$$

the coefficient ϕ being always $= \tan \alpha$, the angle of sliding for the surface-material of the balls upon that of the inclined planes.

Reverting now to the time balls B_1 , B^2 , those which, *being left behind*, record the instant of the arrival of the shock at the instrument,—it has been stated that we have no occasion to determine their subsequent movements; it may be well, however, to clear our notions generally as to what these will be. Rotation is almost instantly communicated to these balls by adhesion with the moving planes on which they rest. The block moves off horizontally (in the direction of the wave) from the ball, which rolls thus with a retarded motion up the inclined plane in a relatively opposite direction. The block attains its maximum velocity V , and, coming to rest, reverses the direction of its own motion, and now follows back after the ball that it had left behind, which it *may* overtake, and *strike*, with a relative velocity equal to the sum of its own velocity and that of the ball, or to their difference, dependent upon the state of motion of the ball at the moment of impact. The impact calling forth elastic force from ball and block, the former will be thrown up along the inclined plane; but the extent of this movement, or whether it occur at all, will depend upon the dimensions and velocity of the wave itself (resolved into the line of movement on the inclined plane) and upon the elasticity, &c. of the ball and block. These we have no occasion to pursue further: the *actual* movements of these balls, B_1 and B^2 , however, will be found recorded in time also, by their own pencil-tracers on the cylinder; but the only indication that concerns us, is the first instant of broken contact, as already explained.

A *single* seismometric observatory, such as has been now described, set up within a given region of disturbance, is capable of giving the elements, necessary for the calculation of the position of the seismic focus, but without the power of controlling the accuracy of the results, except in so far as coincident repetitions may confirm or refute them. But if *three such* seismometric observatories be set up within the region chosen, in positions that shall form the angles of a triangle with respect to each other, at moderate distances apart (from 15 to 30 miles), and these be all connected by galvanic wires, so that the whole of their records shall be made upon a single paper cylinder, moved by a single clock in one of the three observatories, we then have a further control, and an independent method of obtaining, both the horizontal component of direction, and the surface-velocity, from which, by methods yet to be stated, the depth of origin may be calculated without direct ascertainment of the vertical component in Z . The cylinder must in this case carry twelve pencil-tracers, four leading from each observatory.

This leads us to the second and somewhat simpler form of seismometer proposed by me, and shown in figs. 4, 5, 6 and 7 (of Plate XV.). In some respects, the principles of this instrument are the same as of that just described: like the former, it is a double instrument, each instrument having two moveable balls; but their action is different. Fig. 4 represents, in elevation, one of these instruments (let us suppose, that N. S.) as seen looking eastward, and the upper part of which is seen in plan in fig. 5. ss is the floor of the observatory within which the two similar instruments are placed. tt is a shallow and flat-bottomed dish or basin of some feet in diameter, and about nine inches in depth, formed by a circular wooden curb or rim secured to the floor.

In the centre of this, there stands up vertically a very stiff pillar or upright, rigidly secured into the floor, and which may be either of hard stone, hollow cast iron, or of hard wood, but best of the second. Its upper end is formed of wrought or cast iron in the form shown; and into it are secured the vertical supports of hardwood, s, s , which are placed with their parallel and vertical axes in the plane of the meridian or at right angles thereto, and are prepared,

so as to support the balls B and B₂ upon their upper ends, which are *slightly* hollowed to the same curve as the surface of the balls, as seen at full size in fig. 7. The balls, when in this position, rest against and are steadied by the hollow stop over the axis of the vertical pillar, *b* in figs. 4, 5, and 6.

The balls may be common cast-iron cannon shot, chosen of good spherical form and of equal weight; and each ball is in metallic connexion at one point of its surface with a galvanic-circuit wire, of which it forms one pole, marked *e* *t*,—the supports *s*, *s*, and the stop *b*, being all of hard wood or other insulating material, as pottery or glass. The height of the central column should be such, that the centre of gravity of each of the two balls, when on their supports, may be some submultiple of 32 ft. = *g* (say 8 feet = $\frac{1}{4}g$), for facility of calculation.

The shallow basin *t* *t* is subdivided in two semi-circular separate areas, by a wood division, *d*, equal in depth to the outer rim, this division crossing in the diameter which lies at right angles to the plane of the supports *s*, *s*,—i. e. being east and west for the north and south balls, and *vice versa* in the other instrument. Each segment of the shallow basin is lined within its outer rim and bottom with sheet-lead, which is at one point of each in metallic contact with the other pole of the galvanic circuit marked E₂—.

The two segments of the dish are filled up to the level of the surrounding rim, with a bed of damp sand, preased uniformly and “struck off” level to the rim by a straight edge, so as thus to present a uniform bed 9 inches deep, the balls B, B₂ being 6 inches in diameter and 8 feet above it. While the instruments (i. e. that N.S. and E.W.) are thus prepared, the galvanic circuit remains constantly *broken*, the poles formed by the balls being insulated from the other poles formed by the sand-beds, the lead lining, &c. Suppose now, in fig. 4, an earthquake-wave to emerge from S. to N. in the direction of the arrow; the ball B₂ is *left behind* as in the former instrument, topples off its slender support *s*, and commences to fall to the surface of the sand. The moment it strikes the sand, it makes contact with its own circuit, and as the time of its fall can be exactly calculated and is constant (neglecting the small resistance of the air), this ball (as before) marks the precise moment of the arrival of the shock at the instrument. The other ball B is urged forward by the movement of the whole instrument in the direction of the arrow, or that of the wave's emergence, being supported by *s* and *b*, until the instrument acquires its maximum velocity *v* as before. This ball is then thrown off from its support with this velocity, and, describing a small trajectory in air, falls to the bed of sand, and in its turn makes contact with its own galvanic circuit. The ball partially buries itself in the damp sand at the spot it falls upon, without change of position from any elastic effort, all such being absorbed by the “deadness” of the sand. If the shock has been in the plane of the meridian, the place where it shall land on the sand-bed will also be in that plane, say at B'.

Then the horizontal distance from the centre of its support *s* to the centre of the ball, measures the horizontal component of the velocity, this space being described by it during the time of its descent through eight feet. The difference in time (as shown upon the ruled paper by the pencil-tracers and clockwork as before) between the instant of B₂ and of B leaving their supports, is almost exactly = $\frac{t}{2}$, or half the time of the wave.

The same explanations will apply to the other, or E. and W. instrument; and if the azimuth of emergence θ be somewhere between N. S. and E. W., all four balls will be displaced, and the *obliquity of throw* of each of the balls

B (N. and S.) and B (E. and W.) from their respective cardinal and vertical planes, will indicate the actual azimuth of the horizontal component of the earthquake wave—giving this indication in two ways, each controlling the other,—viz. by direction of throw as stated, and by distance of horizontal traject, which will be proportionate to sine and cosine θ .

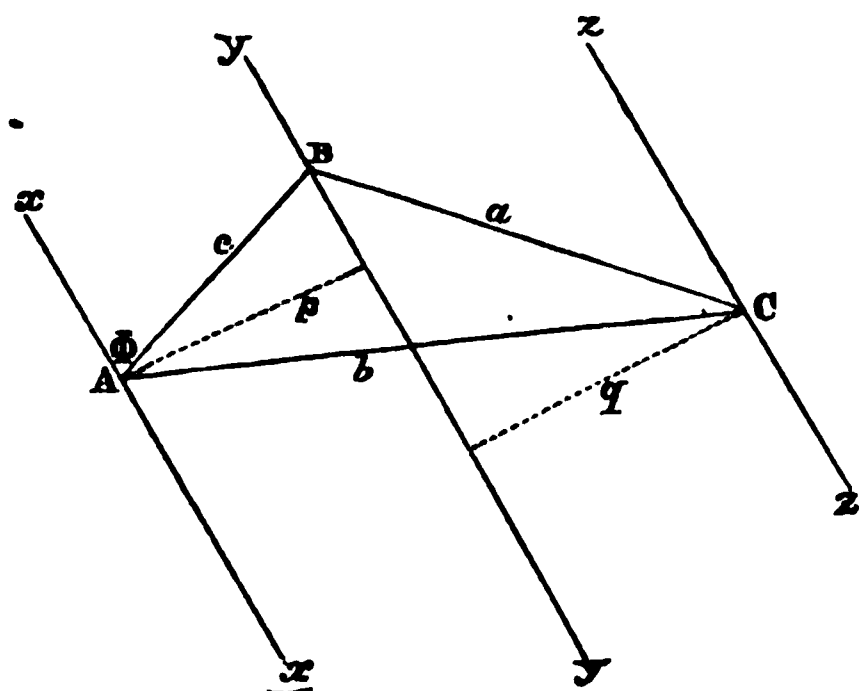
The stop b , it should be remarked, is hollowed at contact with each ball, so as to embrace 90° of its horizontal great circle; so that in case $\theta=45^\circ$ from the meridional or the E. and W. planes, the balls cannot slip aside, but must be thrown in the same direction, the extreme angles of the stop then passing through the plane of motion and centre of gravity of the balls.

Figs. 5 and 6 show in plan the relative positions of the N. S. and E. W. instruments, the upper portions alone being represented, and not at the necessary distance apart.

These instruments singly, then, give us the velocity of the wave and its direction in azimuth with considerable accuracy; but their full value would only be ensured by placing three such seismometers within a given district (as already stated for the former instrument) and connecting them all by galvanic wires, so that the indications of the three shall be recorded by a single clock register. We then have the *time of arrival* of the shock at each seismometer given with perfect accuracy, from which both its horizontal velocity and azimuth may be computed; and the relative positions and distances apart of the several seismometers being known, the true direction of emergence of the wave, and the point of the surface vertically over the origin, and the depth of the focus itself may be computed. The two following methods of computing these are due to Professor Haughton, of Trinity College, Dublin, who communicated them to the Geological Section of the British Association at Dublin, on the occasion of this report being read, and from whom I have received them for publication here.

The determination of the “coseismal line”—a term first used by me at the suggestion of Sir John Herschel, to signify, the crest of the simultaneously emergent earth-wave upon the earth’s surface at any moment of its progress—is the same thing as determining the direction of its motion on the surface, a horizontal tangent to the coseismal line at any point being always orthogonal to the direction of motion.

Given the Times of an Earthquake Shock at three places, to determine its Horizontal Velocity and Coseismal Line.



Let A, B, C, denote three stations at which the time of arrival of the earthquake shock is determined by the seismometers or other means, and let

a, b, c , denote the distances between them; let v denote the unknown horizontal velocity; and let Φ denote the unknown angle made by the coseismal lines $x A x, y B y$, with the line $A B$ joining the first two stations; and t_1, t_2, t_3 be the times of the observed shock at A, B, C , respectively.

Letting fall the perpendiculars p and q , we find,

$$v = \frac{p}{t_3 - t_1} = \frac{c \sin \Phi}{t_3 - t_1} \quad \dots \quad (1)$$

$$v = \frac{q}{t_3 - t_2} = \frac{a \sin (B - \Phi)}{t_3 - t_2} \quad \dots \quad (2)$$

Equating these two values of v , we find

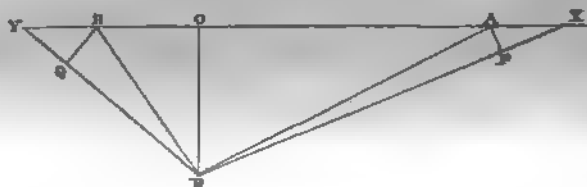
$$c(t_3 - t_2) \sin \Phi = a(t_3 - t_1) \sin (B - \Phi).$$

Expanding, and solving for $\tan \Phi$, we finally obtain

$$\tan \Phi = \frac{a(t_3 - t_1) \sin B}{c(t_3 - t_2) + a(t_3 - t_1) \cos B} \quad \dots \quad (3)$$

Having found Φ by means of this equation, we can then determine v from either (1) or (2).

Given the Horizontal Velocity of an Earthquake at any two points, and its absolute velocity; to find the position of the focus from which it has proceeded.



Let A and B be the points under consideration, and for simplicity suppose them to lie at opposite sides of the unknown focus F , and in the same vertical plane passing through F . [These suppositions are only made to simplify the figure, but do not in any way diminish the generality of the result.]

Let AX be the space moved through on the surface of the ground at A in the unit of time, and equal v the horizontal velocity, and let BY be the velocity at B and equal v' . Letting fall the perpendiculars AP and BQ ; PX and QY will denote the spaces described by the earthquake in a *radial* direction (FX or FY): they are therefore equal and each is the *absolute* velocity of the earthquake $= V$. Hence

$$\cos AXF = \frac{V}{v} \quad \dots \quad (1)$$

$$\cos BYF = \frac{V}{v'} \quad \dots \quad (2)$$

Therefore since v, v', V are all known quantities, the angles AXF and BYF are also known, and therefore the lines XF and YF may be drawn, and their intersection F will give the required position of the focus.

Corol. 1. If the position of the point O , at the surface, from which the earthquake appears to radiate, be known; one velocity will determine the depth of the focus.

Corol. 2. Independently of any diminution in the *absolute* velocity of the earth-wave, the apparent horizontal velocity will diminish rapidly, approaching indefinitely the limit V . This is evident from the geometrical considerations arising from the fact that PX is always equal to QY .

It is obvious, then, that by the establishment of these very simple and inexpensive seismometers, and connecting them galvanically (as respects their registration) by methods now become both familiar and simple, we may get good first approximations to one of the most important questions of the physics of our globe—a knowledge of the depth from which earthquake impulses arrive.

Simple and inexpensive, however, as the apparatus recommended is, its establishment in the only way in which it can be of much real use, namely by connected distant stations, involves the choice of seismic areas fitted for the purpose, and the support and aid of governments, if not for outfit, at least for appointment of observers, and police protection of stations and wires. It is to be hoped that even these may not be withheld as the advancing knowledge of the importance to physical geology of seismic research becomes better understood and diffused. Meanwhile a still simpler form of rough seismometer, suited to the resources of distant and isolated observers, may be with advantage, perhaps, pointed out,—and also an indirect method, by which the depth of earthquake origin may be approximated, without the use of seismometers of any sort. The form of seismometer about to be described is most applicable to seismic districts where the angle of wave-emergence is not steep, *i. e.* where the shocks are usually nearly horizontal.

If any homogeneous, parallelopiped, or rectangular prism, standing on end, upon a level surface, be upset by its own inertia, the supporting surface being suddenly moved beneath it, in the direction of its own plane (as by the horizontal component of an earthquake shock), it may be shown that the velocity of the surface must be

$$V^2 = \frac{4}{3}g \sqrt{a^2 + b^2} \times \left(\frac{1 - \cos \theta}{\cos^2 \theta} \right)$$

where a is the altitude of the solid, b its diameter of base, and θ the angle formed by the side and a line drawn through the centre of gravity to the extremity of the base, and $V^2 = 2gh$.

This velocity is independent of the density or material of the *solid*, because the oversetting force, being its own inertia, is always proportionate to the density. With a given velocity V , therefore, it is possible to assign the dimensions a and b such, that it shall be *just upset*; and with this velocity another solid, having θ greater, shall remain unmoved,—assuming always that friction upon the supporting surface gives sufficient adhesion to cause the solid to upset, and not to slide (partly or wholly) without upsetting.

If in place of a square prism like a wall, the solid be a right cylinder, such as a pillar, the diameter of whose base, as before, is b ; then

$$V^2 = \frac{15b^2 + 16a^2}{12a^2} \times g \sqrt{a^2 + b^2} (1 - \cos \theta);$$

and from this very simple expression for the horizontal velocity, for which I am indebted to my friend Professor Haughton, it is easy to construct a seismometer of the greatest simplicity, that (in the absence of better means) shall give, within a narrow limit, the actual velocity of shock.

Let there be constructed two similar sets of right cylinders, say each set, six to twelve in number, all of equal height (a) and of the same sort of material, but varying in diameter in each set, with a uniform decrement from the greatest to the least.

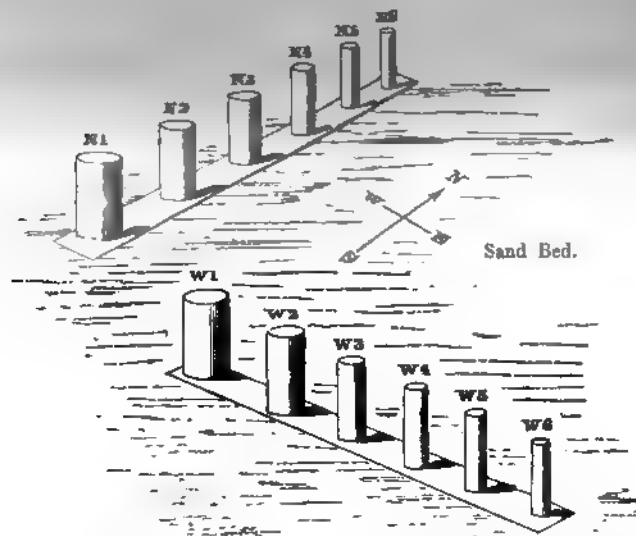
Convenient dimensions for earthquake observations of *mean* intensity, will be such, that the cylinder of largest diameter shall have its altitude equal to three diameters, or $b = \frac{a}{3}$, and that the cylinder of least diameter shall have

its diameter one-third of that of the greatest one, or $b = \frac{a}{9}$. Any number of cylinders of intermediate diameters may be interpolated between; and the greater the number, the more accurate the instrument becomes. A series of six to ten in each set will, however, be sufficient for any purpose. For observation of shocks of extreme violence, larger diameters, in proportion to altitude, should be chosen for all the cylinders.

The material of the cylinders is not important, cast iron, stone, pottery, or other substances at hand, whose *arrises* will not crumble away by being overthrown, may be used; but no material will be found more convenient than some hard heavy wood, of uniform substance, straight grain, and equable specific gravity, from which the cylinders can be formed in the lathe, and their bases brought perfectly square to the axis with facility.

Upon any horizontal and solid floor let two planks be placed, as in fig. 6, with their directions in length respectively lying N. and S. and E. and W.,

Fig. 6.



each plank to be about 3 inches in thickness, and in width equal to the diameter of the largest cylinder, and its length such that the set of cylinders, when placed upright and equidistant thereon, shall have a space greater than the altitude between each. Thus, if the cylinder of largest diameter have $b = 0.5$ of a foot, the length of plank will, for a set of six, as in the figure, be about 12 feet. These base-planks being *fixed*, level, and solid, the floor is to be levelled up to their upper surfaces with dry sand, and the two sets of

cylinders adjusted to their places, one set running in an east and west, and the other in a north and south direction, so that in whatever direction the horizontal component of shock may move, the overthrown cylinders, of one or the other set, shall fall transversely to the lengths of either of the plank bases, and, lodging on the sand-bed, *remain exactly in the position as to azimuth in which they were overthrown*. If now a shock of any horizontal velocity capable of overthrowing some of the cylinders, but not all of them, arrive, it will throw down at once all the narrower ones, and up to a certain diameter of base. For example, suppose a N. and S. shock, of such velocity as to overthrow W 6, W 5, and W 4, leaving W 3, W 2, and W 1 standing; then V will have been *greater* than the velocity due to the overthrow of W 4, and *less* than that due to the overthrow of W 3, and, within those limits, may be found from the preceding equation. The cylinders here overthrown, W 6, W 5, and W 4, will be found with their axes lying N. and S., at rest upon the sand-bed. The cylinders N 6, N 5, and N 4, will be also overthrown; but in this case they will fall in the line of their own plank bases, and *may* roll and so give no indication as to direction of shock in azimuth. Hence the necessity for two sets of cylinders; one set, however, will be sufficient, if space enough be provided between the cylinders, and if each be placed upon a cylindrical and separate basis of a diameter equal to its own, and in height equal to the depth of the sand-bed.

This form of instrument, then, is capable of giving approximate determinations of—

1st. The velocity of the horizontal component of shock, neglecting the vertical component, which may be done where the angle of emergence is not great.

2nd. The azimuthal direction of the horizontal element of shock.

3rd. Its absolute direction of primary movement, viz. the direction of translation of the wave, which always coincides with the direction of molecular movement of the elastic wave itself, in the first half of its complete phase: *e. g.*, if the wave show a N. S. azimuth, by the line of direction of axes of the overthrown cylinders, and these be thrown to the northward, then the wave has traversed from S. to N.

4th. The exact time of the transit of shock may be also indicated if the narrowest cylinders, N 6 and W 6 be connected with a clock, so as to stop it at the moment of overthrow by the very simple means which I have pointed out in the 'Admiralty Manual' (art. "Earthquake," sec. vii., p. 208, 2nd edit.), inasmuch as, by hypothesis, the narrowest cylinders will be *always* overthrown.

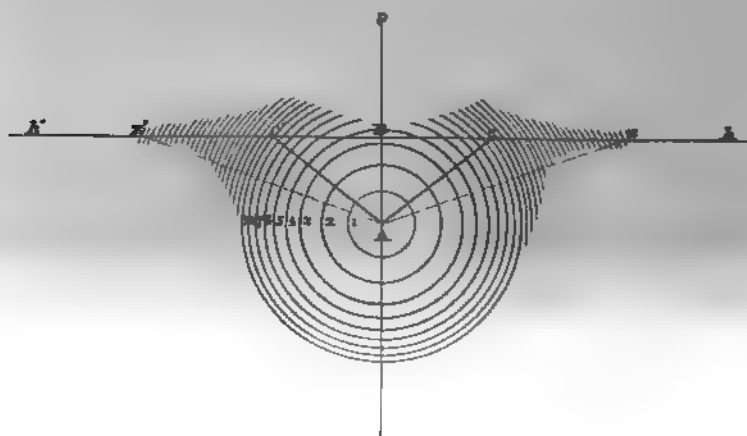
A single cylinder or prism, however entirely distinct from either seismometrical set, and of even less stability as respects shock, may be with advantage adopted as the means for stopping the clock by the above method, which is capable of giving the time to within 0.1 of a second.

It is obvious that the application of the principles involved in this form of seismometer to observations made upon the recent overthrow of walls, columns, or other such objects to be found in regions which may have been visited by earthquakes, is capable of giving also approximate measures of velocity and direction of shock. This class of seismic observation will, I hope, be found more fully developed elsewhere.

In conclusion, one other method of indirect seismometry remains to be explained, which does not require the aid of any seismometric instrument. The facts upon which this method depends have been alluded to in the Report on Earthquakes of 1850, p. 35. It has been long observed that, in extensive surfaces of country that have been exposed to the effects of shock,

certain zones or areas of surface, more or less irregular, present themselves, within which the destructive effects upon buildings and other objects capable of overthrow are manifested much more intensely, than upon similar objects situated upon other portions of the superficies of the country. These zones of maximum disturbance (as yet ill observed) have been remarked to run in curvilinear directions of surface, to approach more or less, according to the means of (*i. e.* the objects afforded for) observation, to closed curves, and to be wholly distinct from those variations of destructive agency, irregularly *parcenné* over large shaken areas, which depend upon differences of geologic surface-formation, configuration of country, &c., construction of buildings, and many other conditions, which modify the direction and effects of the shock at points often very little removed from each other, and the analysis of which, and extrication of the true primary movement from the entanglement of such minor phenomena, constitute the greatest difficulty of earthquake observation. The physical conditions which give rise to such zones of maximum disturbance are easily explained.

Fig. 7.



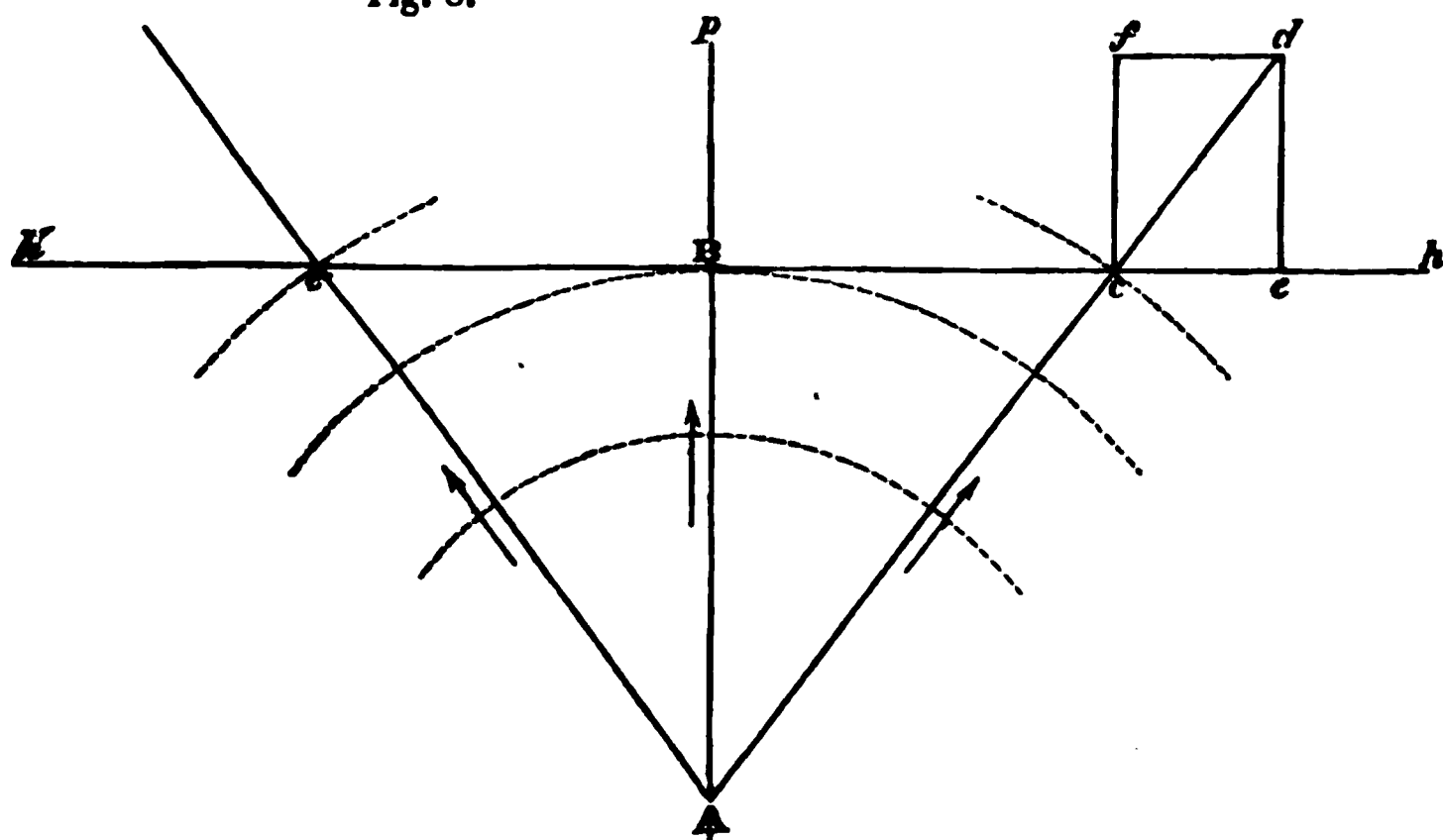
Referring to fig. 7, let $A'h$ be the horizon (which we may assume a right line) cut by a vertical plane passing through a great circle of the earth, and through A , the centre of impulse of the earthquake. The blow from this origin is propagated outwards in all directions, through the elastic mass of the earth (here assumed homogeneous), in spherical concentric shells, which the circles 1, 2, 3, 4, &c. denote, at similar phases of the wave. The elastic wave starts from the impulse with one normal and two transversal vibrations. Its *vis viva* must remain constant, and (in the same medium its dimensions being very great) the velocity of translation also. The mass in wave-movement, at any moment of its transit, is therefore the same, and the thickness of each successive spherical shell decreases from the centre of impulse as the square of its mean distance. This is the measure of the normal excursion of any particle, from any given phase of the wave, in its passage outwards, to the recurrence of the same phase, and is also the measure of the normal intensity of the shock, or that in directions AB , AC , AZ , &c. Neglecting for the present the effects of the transversal wave, the normal intensity or direct overthrowing power of an earthquake shock varies inversely as the square of the distance from origin. But the *surface* capability of the shock

to overthrow buildings, &c. depends not only upon its intensity, but upon the direction of its movement with respect to the horizon. A shock perfectly vertical has no tendency to overturn the *walls* of a house, though it may bring down the roof or floors. Now it is obvious from the figure, that as the wave passes outwards from the origin, A, it reaches the earth's surface vertically at B, the point in the prime vertical, pA , directly over the same; and that as it travels outwards, it emerges at the surface with angles more and more nearly horizontal; the angle of emergence being the same at all points of any coseismal line, all such lines being, on the assumption of homogeneity, concentric circles round B (like those upon a pond into which a stone has been thrown).

So far as the *direction* of wave motion is concerned, therefore, its power to overturn buildings is greater the further it has travelled, or the greater the radius of the coseismal circle from B; but its *energy* has been shown to be inversely as the square of the distance (not upon the earth's surface, but in the normal). Hence it follows that there must be some given distance upon the surface around B at which the combined effect, of most advantageous direction and lessened energy, shall produce the most destructive effects upon buildings, &c., or a point, C, intermediate to B and Z, or Z' supposed at any indefinite distance, at which the shock will be, in this respect, a maximum. The radius BC will then describe a coseismal circle upon the earth's surface, which will be a zone of maximum disturbance.

Conversely, if we can trace by observation of the shaken country such a zone, or ascertain three points in its circle, we can find the centre of the circle or the point B, which is plumb over the centre of impulse beneath; and if we have ascertained the angle of emergence that produces the maximum effect (and which is a constant), we can then calculate the depth of the centre of impulse, A, beneath the earth's surface.

Fig. 8.



Referring to fig. 8, let A be, as before, the centre of impulse; B the point upon the earth's surface (supposed a plane), in the prime vertical pA , directly above it. It is required to find a point, C, at which the horizontal overthrowing effects of an impulse in the direction AC, whose intensity varies inversely as the square of the distance, shall be a maximum.

Produce AC to d , and complete the parallelogram of forces, $f d$ being parallel to the horizon.

Let $BA=a$, the depth of origin;
 $BC=r$, the radius where the horizontal force is a maximum;
 AC =the normal due to this radius.
 The angle $Cde=BAC=\theta$.

Then the force at C in the direction AC is $\frac{1}{a^2+r^2}$; and that in the direction of the horizon is $\sin \theta \times \frac{1}{a^2+r^2}$; and as

$$\sin \theta = \frac{r}{\sqrt{a^2+r^2}}$$

we have $\sqrt{a^2+r^2} : r :: 1 : \sqrt{a^2+r^2}$

and $\frac{1}{a^2+r^2} \times \frac{r}{\sqrt{a^2+r^2}} = \frac{r}{(a^2+r^2)^{\frac{3}{2}}}$ a maximum.

Differentiating, $(a^2+r^2)^{\frac{3}{2}} \times dr - \frac{3}{2}(a^2+r^2)^{\frac{1}{2}} \times 2r = 0$.

$$a^2+r^2=3r^2$$

$$r = \frac{a}{\sqrt{2}} = \frac{a\sqrt{2}}{2}.$$

The angle CAC' is therefore very nearly $70^\circ 31' 43''$, which is the angle of the cone whose base in the horizontal plane limits the zone of maximum disturbance; and as the angles at B are right, the angle of emergence $BCA=54^\circ 44' 9''$, and the sides of the triangle, $BC : BA : AC$, are to each other in the ratios of

$$1 : \sqrt{2} : \sqrt{3}.$$

Hence we arrive at the very simple practical rule.

Having found the coseismal zone of maximum disturbance by observation, or three points in it, and the centre of the circle passing through them, the depth below the surface, of the origin or centre of impulse, will be the diagonal of the square whose side is equal to the radius of the given circle.

Within certain approximate limits, then, the application of this rule is capable of giving some information upon that great object of research, to which, above all others, seismological investigation points, namely, the depth beneath our surface from which such impulses reach us, and, by consequence, that at which active volcanic forces are in operation within our planet.

This method can scarcely be applied in very mountainous regions, unless both mountain-formations and seismic energy be developed upon a grand scale, as in Mexico and South America; and in every case the observer will find himself encumbered and perplexed by the interference of many minor circumstances of disturbance to mask and render difficult his observations. These, however, should not prevent our bearing the method in mind whenever favourable conditions present themselves for its use.

In the present state of the theory of wave-movements in elastic solids, it cannot be said to be experimentally certain, that the energy of the wave, in the normal, does diminish with the square of the distance. Another view of the primary conditions of its motion would make it diminish directly as the distance, in which case it may be proved that the angle CAC' of the coseismal cone of maximum disturbance will be 90° and constant, and hence

that the depth of the origin (upon that hypothesis) will be always equal to the radius of the circle of maximum disturbance. It would be out of place here to enter further into the physical discussion of this question, except by referring to Herschel (art. "Light," 'Encyc. Metrop.' vol. iv. paragr. 18. p. 578) and to the various papers of Cauchy, Wertheim, Stokes, Airy, Haughton, and Maxwell on the subject.

I have stated that in the preceding investigation the effects of the transversal wave are neglected. In the observation of actual earthquake phenomena, this may probably be safely done as respects all points that are at considerable distances from the centre of disturbance. The normal and transversal waves, starting at the same instant, appear to travel with unequal velocities. They part company; and their distance becomes greater, and the interval larger between their arrivals, the further they have both travelled. Were we enabled, therefore, to ascertain the precise velocity of the normal wave, and the exact interval of time between the arrival at a distant point of the normal and transversal waves, we could still by another method arrive at the distance from which they had come, and therefore at the depth of the origin of impulse, if the angle of emergence at one point were known. According to Cauchy, the velocity of transit of the normal is to that of the transversal wave as $\sqrt{3} : 1$ in media of unlimited mass; and Wertheim's modified formulæ for elastic bodies fix it as $2 : 1$. My own experimental observations with the seismoscope have proved to me that the separation of the two waves can be noticed, and the interval of time measured upon even very moderate ranges of wave-transit, not exceeding a few miles; and the observations of earthquake shocks indicate that *one cause* of the tremors that usually *succeed* the main blow, is the later arrival of the normal wave, whose amplitude at considerable distances from the origin is always small.

However this may be, it is certain that in all earthquakes the real mischief and overthrow, at places pretty far removed from above the centre of impulse, are done by the blow from the normal wave, which appears to come first; hence the main observable effects are those of the normal, and we are justified and enabled, *in such localities*, to neglect the transversal. But within a considerable circle of area, whose boundary is evanescent, and whose centre lies at the point B (figs. 7, 8), right above the origin, the actual effects of the transversal wave are very formidable, and can never be neglected.

The ground beneath an object so situated, such as a house or pillar (as the distance from the origin to the surface is the minimum range of emergence, or shortest possible, and therefore its energy the greatest), is almost at the same instant thrown nearly vertically upwards by the normal wave, and at the same moment rapidly forced forwards and backwards horizontally in two directions orthogonal to each other; and this combined movement, which is that called "vorticoso" by the Italians and Spanish Mexicans, is one that nothing, however solid and substantial in masonry, &c., can long withstand.

Hence it follows that, within the zone of maximum disturbance which we have treated of, and occupying its central region, we shall always find an area, more or less circular, also of great overthrow and destruction, though presenting entirely different characteristics as to the manner of overthrow of the buildings, &c. This middle region may therefore be sought for as a further directrix to the point B over the centre of impulse. It may be necessary to remark that this combined movement, due to the two transversal waves, and *limited* to a region closely above the prime vertical passing through the centre of impulse, must not be confounded by any misconcep-

tion of the phrase "vorticoso," with that false notion of vorticose shock, such as was presumed to have twisted the Calabrian obelisks, &c., the real nature of whose displacement I indicated in 1846. (Trans. Roy. I. Acad. vol. xxi. part 1. See also 1st Report Trans. Brit. Assoc. 1850, pp. 33, 34.)

In conclusion, I would repeat my conviction that a further expenditure of labour in earthquake catalogues of the character hitherto compiled, and alone possible from the data to have been compiled, is now a waste of scientific time and labour. The main work presented for seismologists in the immediate future, must consist in good observations, with seismometers advantageously placed at sufficiently distant stations, and galvanically connected as to time; and in the careful observation of the traces left by great shocks (when of recent occurrence) upon buildings and other objects artificial and natural, with a view to determining the nature of the forces that have affected them, aided by the resources of the physicist and mathematician.

Amongst the unknown regions of our world, as respects the recurrence of earthquakes and their phenomena, the most prominent are Central Africa, Abyssinia, Madagascar, Northern Asia, and the north-west of North America. For observations of the last, the new settlements about being formed at Vancouver's Island will, no doubt, offer great facilities, as well as future access to the great Aleutian chain of volcanoes and their seismic zone.

I reserve for the Appendix a few observations, upon great sea waves and certain ill-understood phenomena, which could not systematically find place in this Report.

APPENDIX.

No. I.

(P. 48.) The following table of some of the men and events upon which the progress of human knowledge and discovery and the diffusion of mankind have depended, may serve to illustrate the relations that these bear to the expanding character of the catalogue:—

	Date. A.C.
Yards for spreading ships' sails invented	1200
Silver money. —Anchors. First sea fight	700
Amber and tin carried by Phœnicians from the Baltic and England to the Levant..	600
The sounding-line used at sea.—Maps in use.—Multiplication table.—Moon's eclipses calculated. Pythagoras	500
Trireme galleys in use.—The burning-lens known	400
War chariots in Gaul.—Arrack brought from India into Europe.—Electricity noticed.—Hemp, cordage (?), and sails (?)—Aristotle	300
Clepsydra. Balleste. Silver coin at Rome. The olive.—Chinese wall.—Hannibal Lucullus introduces cleansing soap from Gaul.—sal-ammoniac from Egypt.—Solar year fixed	200
Christ born.—Seneca.—Strabo.	A.D.
First sea voyage to India probably	3
Stained-glass windows—the vine—Saw-mills—Monachism—all in Germany .	300
The Western Empire. Public lights at Antioch.—Church bells	400
The dark ages commence.	
Franks Christianized. Silk-worms in Europe	500
Hops. Quill pens.—Latin disused.—Mahomet I	600
Charlemagne names the days and months	800

	Date A.D.
Oxford and Cambridge Universities.—First book.—Alfred the Great	900
Arabic notation in Europe.—Wheel clocks in use.—The first crusade	1100
The three last crusades.—The sugar cane in Sicily.—Coal as fuel.—The corporation of London.—The Popish inquisition.—Saladin	1200
English parliaments.—English in our law courts.—Gunpowder.—Cannon.—Mari- ners' compass.—Printing.—Engraving.—Oil painting.—Coaches.—Roger Bacon. —Wiclif.—Tamerlane	1400
America.—Columbus's four voyages, from 1492–1504.—Cape of Good Hope.— Indian Sea.—Vasco di Gama, 1499.—John and Sebastian Cabot, 1497.—Public road and bridges through Western and Southern Europe.—Luther.—The Re- formation	1500
Logarithms.—Watches.—Barometer.—Telescope.—Mercator.—Italian book-keep- ing.—Jupiter's satellites discovered.—Copernicus.—Galileo.—Magelhaen's voyage, 1520.—Drake's voyage, 1580	1600
Royal Society.—Newton.—Sextant.—Chronometers.—Greenwich Observatory.— Tea into Europe.—Clive.—Penn.—South Sea Company.—Cod and herring fisheries.—Semaphore.—New style calendar.....	1700
Anson's voyage (1744)	
Cook's last voyage (1779)	
La Perouse (1788)	
Vancouver (1795)	1800 to present date.
Watt's steam engine (1796)	
Napoleon.—Nelson.—Embassies to China and Japan.—Vaccination.—Gas lights. —Life-boats.—Public docks.—Public coaches and diligences.—Newspapers abundant	
Steam navigation.—First steam-ship 'Savana' crosses the Atlantic, 1819.—Rail- way system, 1820.—Electric telegraph, 1830.—Law of tides—of storms.— Gold in California—in Australia	

No. II.

(P. 57.) From the interest that belongs to observations of earthquakes in the Southern Hemisphere, hitherto so seldom recorded, I append the following extracts from the letter of an intelligent friend, referring to the New Zealand shock of 1854-55, written very soon after the event. The writer is a civil engineer.

The New Zealand Earthquake.

“ Wellington, 23rd January, 1855.

“ Whilst sitting reading and talking at 8.50 p.m., I felt the house (which had been shaking with the occasional N.E. gusts so usual at Wellington) give a very extraordinary shake, which seemed to continue, and was accompanied by a fearful noise. I at once jumped up, rushed, as well as the violent motion would permit me, into the front garden, the motion increasing in violence, accompanied by a roaring as if a large number of cannon were being fired near together, and by a great dust caused by the falling chimneys. The motion at first was a sharp jerk back and forwards in a N.E. and S.W. direction, increasing in extent and rapidity, until I got into the garden—say 25 seconds; it was then succeeded by a shorter and quicker motion at right angles, for nearly the same time, still increasing, but appearing to be perfectly in the plane of the horizon. This was followed by a continuation of both, a sort of vorticose motion, exactly like the motion felt in an ill-adjusted railway carriage on a badly-laid railway at a very high speed, where one is swayed rapidly from side to side. This was accompanied by a sensible elevatory impulse; it gradually subsided; and the above, constituting the first and greatest shock, lasted altogether, I should say, 1' 20' or 1½' at Wellington. The earth continued to vibrate all night like the panting of a tired horse, with occasional shocks of some violence, decreasing in frequency and violence towards morning, and nearly all in the N.E. S.W. direction, some of them a single jerk back and forwards like that of one railway carriage touching another, but generally they were followed by a vibration gradually decreasing. These lasted, with increasing intervals, until I left Wellington on the 11th April. For the first week after the first shock, the vibration never wholly ceased. All the brick buildings in Wellington were overthrown, or so injured, as to necessitate their removal; the Hutt Bridge was thrown down; the hill-sides opposite Wellington were very much shaken, as evidenced by the many bare patches with which they were chequered fully to the extent of one-third of their surface, whence trees had been

shaken off: this range, particularly its lower portion, appeared to have been the most shaken. It is called the Rimatuka Range, and divides Port Nicholson and the basin of the Hutt from the Warumapa Valley, where the earthquake was felt with greater violence than at Wellington, the ground having opened in many places 8 or 9 feet, and sunk in one place for 300 yards square to a depth of 8 or 9 feet. The cracks are very frequent, and at first were of considerable depth (deemed unfathomable, because people could not see their depth), perhaps 15 or 20 feet in depth, and extending for many hundred yards. Ploughed ground and mud, dry river- or pond-beds were thrown up into all sorts of undulations like a short cross sea, the ridges in some cases 2 feet in height, the prevailing direction of cracks and ridges being generally at right angles to the apparent line of force, N.E. S.W. The strata about Wellington and the Rimatuka are a sort of shale and clay-slate, all broken into pieces not bigger than road-metal, with yellow clay joints; and in places where the overlying clay has been cut through by roads, one can see the cracks caused by former earthquakes filled up by a different-coloured material. I should mention the great sea-wave which came in immediately after the first shock, about 5 feet higher than the highest tide inside the harbour, and 12 feet higher outside; the tide (*i. e.* water-surface) continued ebbing and flowing every 20 minutes during the night, and was most irregular for a week, ebbing further than ever known before. After that time it became more regular; and now the ebb and flow is the same as before the earthquake, but since that, it does not come at high-water within 3 or 4 feet of its former height, proving that the whole southern part of the northern island has been raised, the elevated portion commencing at Wangarua, on the west coast, and going round to Castle Point on the east, where it terminates. The vertical elevation is greatest at the Rimatuka Range, outside Port Nicholson, and becomes *nil* at the above-mentioned points. The shock was felt at Nelson almost as badly as at Wellington, slightly at Canterbury and Ahuriri. It was most violent on the sides of hills at those places, and least so in the centre of the alluvial plains.

"The great shock continued at any one point longer, the further it had diverged from its apparent centre of action opposite Wellington, and became less violent, the motion being slower and not to such an extent. This I think plainly proves (if any thing were wanting to prove) Mr. Mallet's wave theory: any person of the slightest perception experiencing the shock and comparing the statements of persons who had felt it in different places could come to no other conclusion. I do not think the thermometer or barometer was affected; I had no opportunity of observing myself; but so I heard; nor was the compass acted on more than was due to the motion.

"The captain of the vessel I went in to Ahuriri was outside Port Nicholson, lying-to in a gale, and thought his vessel had struck, and was dragging over a reef of rocks; the next morning he passed hundreds of dead fish all of one sort, a species of ling, whose habit it is to lie on the bottom. The shock was also felt by the 'Josephine Willis,' 150 miles off the coast. I only regret, time and want of means prevented my making more accurate observations, and even giving you those I did make in greater detail. W. C. B."

[The direction of primary shock mentioned by the writer is in the line of the mountain-chain, reaching from the interior down to Wellington, and also in that pointing to Tongaroa and other volcanic cones.—R.M.]

No. III.

BIBLIOGRAPHY OF EARTHQUAKES.

At the period of publication of the Second Report on Earthquakes, it was my intention to have prepared a complete Bibliography of Earthquakes, the want of some such index having been much felt by myself, at former periods. Subsequently, however, I found that my friend, Professor Perrey, of Dijon, had had such a work in progress for some years; and he has since published his Bibliographical Catalogues in the 'Mémoires de l'Académie Imp. de Dijon,' vols. xiv. and xv. 2nd ser., for 1855-56, which contained, in alphabetical order, one thousand eight hundred and thirty-seven different works on Seismology. Even yet, however, the store of literature in this speciality are not completely taken stock of. I have hence deemed it best simply to publish, in the following lists, such works as I have found in the several European libraries named at the head of each separate list, along with one in which works, that from various sources have met my eye, are collected. The materials thus given will be, I should hope, of some present service to scientific

travellers abroad; and such portions as are new can be intercalated with future editions of more perfect catalogues, such as M. Perrey's. The following is the order of the library lists:—

1. British Museum.
2. Royal Society of London.
3. Trinity College, Dublin.
4. Royal Library, Berlin.
5. Naturforschenden Freunde of Berlin.
6. Royal School of Mines, Berlin.
7. Library of the University of Göttingen.
8. Royal Library of Munich, Bavaria.
9. Royal Library of Dresden, Saxony.
10. Library of Gand, Belgium.
11. Library of the Mineralogical Museum, Naples.
12. Works on Seismic and Volcanic Subjects from various sources.

Library of the British Museum.

Verhail van de Groote Aertheninghe binnen Mantua in Julio 1619. 4to. Antwerpen. No date.

Account of the late Earthquake in Jamaica. 8vo. London, 1693.

Supplement to the Bishop of London's Letter on occasion of the late Earthquake. 8vo. London, 1750.

Serious Thoughts on the Earthquake at Lisbon. 8vo. London, 1755.

Reflections, Physical and Moral, upon the uncommon Phenomena which have happened from the Earthquake at Lima to the present time. 8vo. London, 1756.

A short and pithie Discourse concerning the engendering, tokens, and effects of all Earthquakes in generall. By T. T. 4to. London, 1580. (Black letter.)

A most true relation of a very dreadfull Earthquake which began upon the 8 December, 1612, and still continueth in Munster, in Germanie. 4to. London, 1612. (Black letter.)

Vera Relatione del Spaventevole Terremoto nelle provincie di Calabria citra et ultra. 4to. Roma, 1638. Also editions in Latin, Neap. 1638; Angl., London, 1638.

Sopra il Terremoto Lezioni tre. 4to. Spoleto, 1732.

Strange News from the North, containing a true and exact relation of a great Earthquake in Cumberland and Westmoreland. 4to. London, 1650.

Relatione dell' horribile Terremoto seguito nella città di Ragusa et altre della Dalmatia et Albania. 4to. Ven. 1667. Alter edit. angl., 4to, London, 1667.

Strange News from Italie; being a true relation of a dreadfull Earthquake in Romania and the Marches of Ancona, April 14, 1672. Trans. from the Italian. 4to. London, 1672.

A relation of the terrible Earthquake at West Brummidge in Staffordshire, January 4, 1675-6. 4to. London, 1676.

Strange News from Lemster in Herefordshire; being a true narration of the opening of the earth in divers places thereabouts. 4to. London, 1679.

Strange News from Oxfordshire; being a true and faithful account of a wonderful and dreadful Earthquake that happened in those parts, September 17, 1683. Folio.

A true and exact relation of the Earthquake at Naples, June 5, 1688. Transl. from the Italian. 4to. London, 1688.

A true and impartial Account of the strange and wonderful Earthquake which happened in most parts of the City of London, 8 September, 1692. Folio.

A Philosophical Discourse of Earthquakes, occasioned by the late Earthquake, September 8, 1692. By C. H. 4to. London, 1692.

A true and perfect relation of the Earthquake at Port Royal in Jamaica, 7 June, 1692. Folio. London.

A full Account of the late dreadful Earthquake at Port Royal in Jamaica, June 22, 1692. In two letters from the minister of that place. Folio.

A sad and terrible relation of the dreadful Earthquake which happened at Jamaco [sic]. 12mo. London, 1692.

A Practical Discourse on the late Earthquakes, with an Historical Account of Prodigies and their various effects. By a Reverend Divine. 4to. London, 1692.

Epistola ad Regiam Societatem Londinensem, qua de nuperis terræmotibus disseritur et

- vera eorum causa eruntur.* 4to. London, 1693. Proposes to account for earthquakes occurring on astrological grounds.
- An account of the late terrible Earthquake in Sicily. Done from the Italian copy printed at Rome. 4to. London, 1693.
- The Earth twice shaken wonderfully; or an analogical Discourse of Earthquakes. By I. D. R. [Rouffinal], French minister. 4to. London, 1693-04. 47 pages.
- The General History of Earthquakes. By R. B. 12mo. London, 1694.
- A full and dismal Account of an Earthquake that happened in Batavia, 28 February, 1700. 12mo. London.
- A true and particular Relation of the Earthquake which happened at Lima, the capital of Peru, the 28 October, 1746; with a description of Callao and Lima before their destruction, and the Kingdom of Peru in general. 8vo. London, 1748. (Erased in Catal.)
- Historia de' Fenomeni del Tremoto avvenuto nelle Calabrie e nel Valdemone nell' anno 1783, porta in luce dalla Reale Accademia delle Scienze e delle Belle Lettere di Napoli. Fel. Nap. 1781.
- Dreadful News, or a true Relation of the great, violent, and late Earthquake, which happened the 27 March Stilo Romano last, at Calabria in the Kingdom of Naples. London, 1638. Gives a list of 30 towns and cities overthrown, and 50,000 people killed.
- A full Account of the great and terrible Earthquake in Germany, Hungary, and Turkey, one of the greatest and most wonderful that ever was in the world. Translated from the Dutch of Leopold Wettersheint de Hodensteen, by Richard Alcock. 4to. London. Date illegible. Refers to Cardan's opinions of earthquakes in "De Sublimitate."
- A Narrative of the Earthquake and Fire of Lisbon. By Antonio Pereira, of the Congregation of the Oratory, an Eye-witness thereof. Translated from the Latin. 8vo. London, 1756.
- A true and exact Relation of the late prodigious Earthquake and Eruption of Mount Etna, or Mount Gibello, as it came in a Letter to his late Majesty from Naples, by the Right Hon. Earle of Winchelsea, Ambassador at Constantinople. 4to. London, 1698.
- Dolorosa Tragedia rappresentata nel regno di Catania, &c. 4to. Catania, 1695.
- Del Tremoto dialogo di Jacomo Antonio Buoni, Medico Ferrarese. Distinto in quattro giornate. 4to. Modena, 1571. 59 pages. A digest in the usual fashion of all old knowledge; and a large catalogue, with approximate dates of earthquakes. This catalogue is very copious and valuable. Ten signs of earthquakes enumerated. Catalogue continued to A.D. 1610.
- Del Tremoto Dialogo del Signor Lucio Maggio, Gentil huomo Bolognese. 4to. Bologna, 1571.
- Bridges' Annals of Jamaica. (The great Jamaica Earthquake.)
- Some Considerations on the Causes of Earthquakes. By S. Hales, D.D., F.R.S. 8vo. London, 1750.
- William Stukely, M.D., The Philosophy of Earthquakes. 8vo. London, 1750. With Part II.
- A Philosophical Discourse of Earthquakes, occasioned by the late Earthquake of 8 Sept. 1692. By C. H. 4to. London, 1693.
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- Jac. Phil. Maraldi, *Observations sur les tremblements de terre arrivés en Italie depuis le mois d'Octobre 1702, jusqu'au mois de Juillet 1703.* In *Hist. de l'Acad. des Sciences de Paris*, 1704. Hist. p. 8.
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- Catalogue des Tremblements de Terre en Chine.* Par E. Biob. *Ann. de Chimie*, 3 ser. vol. ii. p. 372.
- Sopra....., *Sur les petits mouvements apparents observés dans les murs et les grands instrumens d'observatoire de Modena.* Par M. J. Bianchi. 4to. Modena, 1837.
- Ueber das Erdbeben in den Rhein, &c. vom Feb. 1828, von P. C. Egen.* Pogg. Ann. for 1828, part ii. pp. 153–176. An important memoir.

- Beuther, *Compendium Terræmotuum*. Strassburg, 1801.
 Bernhart, *Terræmotus*. (A Register of Earthquakes.) Nürnberg, 1616.
 Dr Vincenzo Magni, *Earthquake of Naples*, 1688.
 Bertrand, *Mém. hist. sur les tremblemens de terre*. La Haye, 1757.
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 Cotte, *Tab. Chron. de princip. Phénom. Météorologiques, &c.* Journal de Phys., vol. lxx.

No. IV.

CATALOGUE OF PERREY'S MEMOIRS.

The immense and long-continued seismic statistics of Prof. Perrey are scattered throughout a multiplicity of Journals of various Learned Societies and elsewhere, and many of them with difficulty accessible in Great Britain.

The author has, at my request, favoured me with the following complete Catalogue of his seismological labours, which it may be serviceable to place in a collected form for reference.

- Perrey (Alexis), *Chronique séismique*. 1 vol. 8vo, MS. 1ère rédaction.
 —, la même. 9 vols. 4to, MS.
 —, *Tremblements de Terre dans les différents siècles et aux différentes époques de l'année*. *Compt. Rend.* t. 12, p. 1185-1187, 21 Juin, 1841.
 —, *Recherches historiques sur les Tremblements de Terre dont il est fait mention dans les historiens depuis le IV^e siècle jusqu'à la fin du XVIII^e siècle*. *Ibid.* t. 13, p. 890-902, 2 Nov. 1841.
 —, *Recherches sur les Tremblements de Terre ressentis à l'Europe et dans l'Asie occidentale de 306 à 1800*. *Ibid.* t. 19, p. 64-646, 26 Sept. 1843. Neuf cahiers seulement m'ont été remis au Secrétariat de l'Institut.
 —, *Note sur les Tremblements de Terre aux Antilles*. *Ibid.* t. 16, p. 1283-1303, 12 Juin, 1843.
 —, *Nouvelles Recherches sur les Tremblements de Terre ressentis en Europe et dans les parties adjacentes de l'Afrique et de l'Asie de 1801 à Juin 1843*. *Ibid.* t. 17, p. 608-625, 25 Sept. 1843.
 —, *Mémoires sur les Tremblements de Terre, en France, en Belgique, et en Hollande, depuis le IV^e Siècle jusqu'à nos jours*. 1843.
 —, *Mémoire des Sav. Étr. et Mém. Cour. de l'Académie de Bruxelles*, t. 18, 4to. 110 pp. et 2 pl. avec Suppl. MS.
 —, la même. 1 vol. 4to, MS. 1ère rédaction avec addit. MS. de M. Quetelet.
 —, *Liste des Tremblements de Terre ressentis en Europe pendant l'année 1843*. *Ibid.* t. 18, p. 393-403, 11 Mars 1844.
 —, *Notice sur les Tremblements de Terre ressentis à Angers et dans le Dép. de Maine et Loire*. *Bull. de la Soc. industr. d'Angers*, t. 15, p. 172 et suiv., 1844. Tir. à part, 8vo de pp. 7.
 —, *Liste de Tremblements de Terre ressentis en Europe pendant l'année 1844*. Avec Supplément pour l'année 1843. *Mém. de l'Acad. de Dijon*, 1843-44, p. 334-342, et comprend t. 20, p. 1444-1452, 12 Mai 1845.
 —, *Sur les Tremblements de Terre de la Péninsule Scandinave*. *Voyages en Scandinavie de la Com. Sc du Nord*. 6 div. Géog. phys. t. 1, p. 409-469. Tir. à part. Paris, 1845. 8vo de pp. 65, avec Suppl. MS.
 —, *Sur les Tremblements de Terre dans le bassin du Rhône*. *Ann. de la Soc. d'Agric. de Lyon*, t. 8, p. 1845. Tir. à part. 8vo de pp. 82, 1 pl. avec notes additionnelles de M. Fournel, et Suppl. MS.
 —, *Sur les Tremblements de Terre dans le bassin du Danube*. *Ibid.* t. 9, 1846. Tir. à part. 8vo de pp. 82, avec Suppl. MS.
 —, *Note sur les Tremblements de Terre en Algérie et dans l'Afrique septentrionale*. *Mém. de l'Acad. de Dijon*, 1845-1846, p. 299-323. Tir. à part. 8vo de pp. 24, avec Suppl. MS.
 —, *Sur les Tremblements de Terre aux Antilles*. *Ibid.* p. 325-332. Tir. à part. 8vo de pp. 68, avec Suppl. MS.
 —, *Liste des Tremblements de Terre ressentis pendant les années 1845 et 1846, avec Supplément pour 1844, et indicative Sommaire des autres phénomènes météorologiques*. *Ibid.* p. 393-479. Tir. à part. 8vo de pp. 87.

- Perrey (Alexis), *Mémoire sur les Tremblements de Terre dans le bassin du Rhin*. Mém. des Sav. Étr. et Mém. Cour. de l'Acad. Roy. de Belgique, t. 19, 1847. Tir. à part. 4to de pp. 114 et 2 pl., avec Suppl. MS.
- , *La lune exerce-t-elle une influence sur les Tremblements de Terre?* Mém. présenté à l'Acad. des Sciences, le 5 Mai, 1847. Compt. Rend. t. 24, p. 822. MS. de 11 pp. en 1 vol. 4to; 1 pl.
- , *Note sur les Tremblements de Terre ressentis en 1851*. Bull. de l'Acad. Roy. de Belgique, t. 19, part 1, p. 353-396, et Supplément; Ibid. part 2. p. 21-28. Tir. à part.
- , la même, avec Supplément pour les années antérieures. Mém. de l'Acad. de Dijon, 2e sér. t. 2, p. 1-65, 1852. Tir. à part.
- , *Mémoire sur les rapports qui peuvent exister entre la fréquence des tremblements de terre et l'âge de la lune*. Compt. Rend. t. 36, p. 537-540, 21 Mars, 1853.
- , le même, MS. original avec pl. et 1 vol. gr. in-fol. contenant les tableaux des Secousses de 1801 à 1850, MS.
- , *Note sur les Tremblements de Terre ressentis en 1852*. Bull. de l'Acad. de Belgique, t. 20, no. 5, p. 39-69, 10 Mai, 1853. Tir. à part.
- , la même, avec Suppléments pour les années antérieures. Mém. de l'Acad. de Dijon, 2e sér. t. 2, p. 7-128. Tir. à part.
- , *Note sur la fréquence des tremblements de terre relativement au passage de la lune au méridien*. Compt. Rend. t. 38, p. 16, 2 Jan. 1854. Ce MS. est relié avec le No. auquel j'ai encore ajouté les tableaux inédits fournis à la Commission pour le Rapport de M. Elie de Beaumont.
- , *Note sur les Tremblements de Terre ressentis en 1853*. Bull. de l'Acad. Roy. de Belgique, t. 21, 1ère part, p. 457-495. Tir. à part.
- , la même, avec Suppléments pour les années antérieures. Mém. de l'Acad. de Dijon, 2e sér. t. 3, p. 1-55. Tir. à part.
- , *Circulaire relative à l'Observation des Tremblements de Terre, adressée à tous les Voyageurs*. Bull. de la Soc. de Géog., 4e sér. t. 7, p. 419-422, Juin, 1854. Tir. à part.
- , *Documents relatifs aux Tremblements de Terre du Chili, avec Appendice sur les Tremblements de Terre dans la province de la Plata*. Ann. de la Soc. d'Agric. de Lyon, 1854, 2e sér. t. 6, p. 324-436. 8vo de pp. 206, avec Suppl. MS.
- , *Note sur les Tremblements de Terre ressentis en 1854, avec Supplément pour les années antérieures*. Bull. de l'Acad. Roy. de Belgique, t. 22, 1ère part. no. 6, p. 526-572, Juin 1855. Tir. à part. 8vo de pp. 49.
- , *Sur les Volcans et Solfatares de l'île de Java, renseignement puisé dans les observations récentes des Hollandais*. Compt. Rend. t. 42, p. 115-116, 21 Janv. 1837. C'est la traduction d'un article sur une solfatare près de Tj. Aray, par M. Bensen, dont M. Elie de Beaumont n'a pas été le nom.
- , *Note sur les Tremblements de Terre ressentis en 1855, avec Supplément pour les années antérieures*. 1ère partie, Supplément, Bull. de l'Acad. Roy. de Belgique, t. 23; 2e part., No. 7, p. 23-68, Juillet 1856.
- , la même, 2e partie. Ibid. t. 24; 1ère part., No. 1, p. 68-128.
- , *Éruption du Manna Loir aux îles Sandwich*. Ann. des Voy. Aout 1856, p. 199-229. C'est la traduction de deux lettres de M. Coan, suivie de quelques remarques sur l'éruption du Vésuve en 1855.
- , *Excursion sur quelques Volcans de Java pendant l'été de 1854*. Ann. des Voy. Oct. 1856, p. 36-65. C'est la traduction de divers extraits du Mémoire de M. Teijsmann, *Bibliographie Seismique*. Mém. de l'Acad. de Dijon, 2e série, t. 4, p. 1-112, 1855; t. 5, p. 153-253, 1856.
- , *Sur les Tremblements de Terre de la Péninsule Ibérique*, Ann. de la Soc. d'Agric. de Lyon, t. 10, 1847. Tir. à part. 8vo de pp. 50, avec Suppl. MS.
- , *Note sur les Tremblements de Terre ressentis en 1847*. Bull. de l'Acad. de Belgique, t. 5, no. 5, 1848. Tir. à part. 8vo de pp. 7.
- , la même, avec Supplément pour les années antérieures. Mém. de l'Acad. de Dijon, 1847-48. Tir. à part. 8vo de pp. 48. C'est une 2e édition, qui pour tous mes catalogues annuels est publiée dans les Mémoires de l'Acad. de Dijon, et qui est plus complète que la première.
- , *Mémoire sur les Tremblements de Terre de la Péninsule Italique*. Mém. Cour. et Mém. des Sav. Étr. de la Soc. Belgique, t. 22. Tir. à part. 4to de pp. 145, 2 pl. et Suppl. MS. Le même avait été approuvé par l'Acad. des Sciences de Turin qui m'avait voté l'impression; voy. *Notizie istoriche dei lavori della Classe delle Scienze nel corso dell' anno 1845*. Cette notice se trouve dans notre collection.
- , le même, MS. 4to, avec Introductions et Considérations inédites.
- , *Documents sur les Tremblements de Terre au Mexique, et dans l'Amérique Centrale*. Ann. de la Soc. d'Émul. des Vosges, t. 6, 2e cah. 1847. Tir. à part. 8vo de pp. 37, et Suppl. MS.

- Perroy (Aletis), Instructions sur l'Observation des Tremblements de Terre. Ann. Météor. de France, 1849, p. 299-311. Extr. gr 8vo.
- , Communication relative à mes recherches rétrospectives sur les Tremblements de Terre, faite à la réunion de la Soc. Géologique à Épinal le 10 Sept. 1847. Bull. de la Soc. Géol., 2e sér. t. 4, p. 1399-1400.
- , Traduction du Mémoire de M. R. Mallet, intitulé, Sur l'Observation des Tremblements de Terre, avec notes additionnelles du traducteur et suivie de la liste des tremblements de terre en 1848. Ann. Météor. de France, 2e ann. 1850, p. 279-300. Tir. à part.
- , Documents sur les Tremblements de Terre et sur les Éruptions Volcaniques dans le bassin de l'océan atlantique. Mém. de l'Acad. de Dijon, an. 1847-1848. Extra 8vo de pp. 67, avec Suppl. MS.
- , Note sur les Tremblements de Terre ressentis en 1849. Bull. de l'Acad. Roy. de Belgique, t. 16, no. 3, 1849. Extr. 8vo de pp. 8.
- , la même, avec Suppléments pour les années antérieures. Mém. de l'Acad. de Dijon. Tir. à part. 8vo de pp. 48.
- , Documents sur les Tremblements de Terre dans le nord de l'Europe et de l'Asie. Ann. Magnét. et Météor. du Corps des Ingénieurs de Russia, an. 1846, p. 201-236. Tir. à part. St. Petersburg, 1849, gr in-4to, à 2 vol., 1 pl.
- , les mêmes, suivis d'une note sur les Tremblements de Terre en 1848. Ann. de la Soc. d'Émul. des Vosges, t. 6, 3e cah. 1848. Tir. à part. 8vo de pp. 71, avec Supplément MS.
- , Sur les Tremblements de Terre dans les Îles Britanniques. Ann. de la Soc. d'Agric. de Lyon. 2e sér. t. 1, 1849. Tir. à part. 8vo de pp. 71, avec Suppl. MS.
- , Note sur les Tremblements de Terre en 1849, avec Suppléments pour les années 1847 et 1848. Bull. de l'Acad. Roy. de Belg. t. 17, no. 3, 1850. Tir. à part. 8vo de pp. 22.
- , la même, avec Suppléments pour les années antérieures. Mém. de l'Acad. de Dijon, ann. 1850. Tir. à part. 8vo de pp. 65.
- , Sur les Tremblements de terre dans la Péninsule Turco-hellénique. Mém. Cour. de Mém. des Sav. Étr. de l'Acad. de Belgique, t. 23, 1850. Tir. à part. 4to de pp. 73, avec Suppl. MS.
- , Note sur les Tremblements de Terre en 1850. Bull. de l'Acad. de Belgique, t. 18, no. 4, p. 291-308. Tir. à part.
- , la même, avec Supplément pour les années antérieures. Mém. de l'Acad. de Dijon, 2e sér. p. 1-36, 1850. Tir. à part.
- , Sur les Tremblements de Terre aux États Unis et au Canada. Ann. de la Soc. d'Émul. des Vosges, t. 7, 2e cah., 1850. Tir. à part. 8vo de pp. 63, avec Suppl. MS.

Desiderata—Ill-understood Phenomena, &c.

Great Sea-Waves.—Perhaps the best account that has yet been given of the phenomena of great sea-waves (due beyond question to earthquake or volcanic movement of sea-bottom), was communicated by Prof. Bache to the American Association for the Advancement of Science, and was reprinted along with a paper "On the Tides of the Atlantic and Pacific Ocean," in 1856, in a separate form by Prof. Bache, at New Haven for private circulation, from which the following are extracts.

On the 23rd of December, 1854, a violent earthquake occurred in the neighbourhood of the Island of Nippon (Japan), the local sea-waves of which wrecked the Russian frigate 'Diana,' anchored in the harbour of Simoda. A correspondent of the 'New York Herald,' writing from Shanghai, states,—“At 9 A.M. on the 23rd of December, weather clear, therm. 72°, barom. 30°, a severe shock of an earthquake was felt on board the frigate, shaking the ship most severely. The shock lasted full five minutes, and was followed at quick intervals by rapid and severe shocks for thirty minutes.” At 9h. 3m. A.M. the sea was observed washing into the bay in one immense wave 30 feet high, with awful velocity; in an instant the town of Simoda was overwhelmed and swept from its foundations. “This advance and recession of the waters recurred five times.” . . . by 2h. 30m. P.M. all was quiet.” The log-book of the 'Diana' states that “the disturbance commenced at 9h. 15m., and that the rising and falling of the water in the bay produced a sudden variation of depth from less than 8 feet to more than 40 feet. The frigate was by this laid four

times upon her side, once in less than 4 feet of water." Commodore M. C. Perry, U.S. Navy, states,—“That the whole eastern coast of Japan seems to have suffered from this calamity. Yedo itself was injured, and the fine city of Osaka entirely destroyed. At 3 P.M. a fresh west wind was blowing at Simoda. The agitation of the water and the movement of the vessel had become very slow; barom. $29^{\circ}87$, therm. $10^{\circ}5$ Reaum. ($=55^{\circ}63$ Fahr.).”

From other sources quoted by Prof. Bache, it appears that on the same day (23rd Dec.), at Peel's Island, one of the Bonin Islands, there was also (the hour not stated) a sudden wave rise of 15 feet above high water, followed by a recession which left the reefs entirely bare. The tide continued to rise and fall at intervals of fifteen minutes, gradually lessening until the evening. Again on the evening of the 25th of December (as to which time there is no account of a second earthquake), the water rose in like manner 12 feet.

The United States Coast Survey, so ably superintended by Prof Bache, possesses stations of observation furnished with self-registering tide-gauges, at San Diego, San Francisco and Astoria, on the Pacific Coast; and Prof. Bache presented to the Association the curves traced by those instruments, in which the comparative heights and times, and the mean heights and times at San Francisco and San Diego, are given; also the tidal curves for both, with the abnormal oscillations superimposed; and lastly, three diagrams, in which the tidal level being reduced to a horizontal line, the abnormal waves alone are shown, for Astoria, San Francisco and San Diego.

I can only refer to the original for the full results deducible from these valuable observations, and repeat here in brief some of their facts:—

“The San Francisco curve presents three sets of waves of short interval: the first begins at 4h. 12m. and ends at 8h. 52m., the interval being 4h. 40m.; the second begins at 9h. 35m. and ends at 13h. 45m., the interval being 4h. 10m.; the beginning of the third is about 13½h., and its end not distinctly traceable. The crest of the first large wave of the three sets occurred at the respective times of 4h. 42m., 9h. 54m., and 14h. 17m., giving intervals of 5h. 12m., and 5h. 23m.”

“The average time of oscillation of one of the first set of waves was 35m., one of the second 31m., and one of the third about the same. The average height of the first set of waves was 0.45 foot on a tide which fell 2 feet; of the second 0.19 foot on a tide which rose 3 feet; and of the third 0.19 foot on a tide which fell about 7 feet; the phenomena occurring on a day when the diurnal inequality was very considerable. The greatest fall of the tide during the occurrence of the first set of waves was 0.70, and the corresponding rise 0.60 foot. In the second set the corresponding quantities were 0.30 and 0.20 foot; in the third *these waves would not have attracted general attraction.*” There is a general analogy in the sequence of the waves of the three sets, which seem to mark them as belonging to a recurrence of the same series of phenomena. The series itself looks like the result of several impulses, not of a single one, the heights rapidly increasing to the third wave, then diminishing as if the impulse had ceased, then renewed and then ceased, leaving the oscillation to extinguish itself. If we had a corresponding account of the facts as they occurred at Simoda, the subject would lose the conjectural or rather the incomplete character that belongs to it. Although there is no account of the place of origin of the earthquake, yet its violence on the Japanese coasts and its diminished effects at Peel's Island, as well as the times of arrival of the waves at the Japanese and Pacific American coasts, prove that it must have been beneath the sea, and not far distant from Japan. “Five distinct waves in succession rolled in at Simoda; eight are shown by the San Francisco gauge, of which seven were of considerable height.” It seems not improbable, although this does not appear to have occurred to Prof. Bache, that three of the San Francisco waves may have been *reflected waves* only. The highest wave at Simoda was estimated at 30 feet, at Peel's Island 15 feet, at San Francisco 0.65 foot, and at San Diego 0.50 foot.

At San Diego, the gauge shows distinctly the same three series of waves. The first begins at 1h. 22m. later than at San Francisco, correcting for difference of longitude, and ends 52m. later. The interval is 30m. less than at San Francisco, the oscillations being rather shorter than at the latter point. The second begins at 54m. later than at San Francisco and ends 34m. later. The third begins about 54m. later than at San Francisco. The average time of oscillation of the

first set is 31m., of the second 29m., being thus respectively 4m. and 2m. shorter than at San Francisco. The average height of the first set of waves was 0·17 foot lower than at San Francisco, and the second as much higher. This fact, taken with the difference in the times of oscillation, induces Prof. Bache to suppose that the difference in the two series was due to interference, which is also suggested by the position of San Diego in reference to the islands separating the Santa Barbara Sound from the ocean.

The difference in the periods of tide on the arrival of the waves at each place would tend to produce discrepancies. The first series at San Diego arrived on a rising tide of 4 feet, while at San Francisco it was upon a falling tide of 2 feet. The second at San Diego arrived at near high water, and was chiefly upon a falling tide of 7 feet, while at San Francisco it was upon a rising tide of 4 feet.

The forms of the waves accord remarkably at both stations.

The tide-gauge at Astoria gives less instructive results, the bar at the entrance of the Columbia River having no doubt broken up and greatly reduced the waves, even if they arrived at the entrance unbroken. The gauge showed a disturbance, but irregular and confused, which was also apparently preceded by (other) unusual oscillations of the water; and Prof. Bache sees reason to think that the San Diego gauge indicates disturbances of the water of an abnormal character *previous* to the great earthquake shock, as well as following it at intervals for several days. The normal time for high and low water does not seem to have been disturbed by the superposition upon the tide-wave of the abnormal or earthquake waves.

From these results Prof. Bache draws the following conclusions as to the rate of translation of the great sea-waves of the earthquake.

The latitudes and longitudes of the stations are:—

	Lat. N.	Long. W.	Time. h. m.
San Diego	32° 42'	117° 13'	7 49
San Francisco.....	37 48	122 26	8 10
Simoda	34 40	121 62	14 44

The distance from San Diego to Simoda is therefore 4917 nautical miles, and from San Francisco to Simoda 4527 nautical miles. Assuming the first account of the disturbance at Simoda at 9 A.M. or at 22d. 23h. 44m. Greenwich mean time, and the first great wave 30 minutes afterwards, Prof. Bache proceeds to calculate the rate. There appears to be some typographical errors in the figures, which slightly affect the result which he arrives at, viz. 363 miles per hour, or 6·0 miles per minute. Correcting the erroneous figures, the result would appear to be,—the first disturbance at San Francisco was at 23d. 12h. 22m., or 12h. 38m. after that at Simoda, and the first great wave at 23d. 4h. 42m., giving the same interval (of 30m.). The distance and time therefore give a rate of 368 miles per hour, or 5·966 miles per minute.

Assuming the second account (9h. 15m.), the time of transmission when reduced would be 12h. 13m., and the rate of translation 370 miles per hour, or 6·20 miles per minute.

The San Diego observations, assuming 9h. 0m. as the time of transmission at Simoda, give 13h. 50m., which, when reduced, gives a rate of translation of 355 miles per hour, which is almost identical with the corrected reduction of the San Francisco observations.

Although not directly connected with our subject, it is interesting to state that Prof. Bache deduces from these results a probable mean depth for the Pacific Ocean on the paths traversed by these great sea-waves of from 2100 to 2500 fathoms. (See also Amer. Journ. of Science, vol. xxi. 2 ser. January 1856.)

I deem no apology needed for this lengthened abstract of Prof. Bache's communication, not only because it is, up to the present time, almost the only record of scientific pretensions, of the phenomena of earthquake great sea-waves, but as a model for those who may be engaged in tidal observations upon British or European coasts, of what is needed to make their results connect usefully with the requirements of those occupied in seismic inquiry. The extreme value of self-registering tide-gauges, and the great importance of multiplying these round our own coasts, and upon those of our Mediterranean and antipodal stations, are forcibly shown by the remark of Bache, that but for these instruments, the very

occurrence on the North American coast of these sea-waves, which had traversed the whole vast breadth of the Pacific, a distance equal to one-fifth of the earth's circumference, would have actually passed unnoticed. Had there been a competent self-registering tide-gauge at Simoda, we could probably have fixed exactly the spot beneath the ocean at which the earthquake disturbance originated.

There is also a class of doubtful great sea-waves, for the investigation of which such self-registering instruments would afford precious data.

It has been many times observed at various stations round our own British coasts (as well as abroad), that abnormal tides have occurred, or that solitary waves of translation have reached the shore, at abnormal periods, or at uncertain periods of repetition, which could not be confounded with any recognized tidal phenomena.

Such waves have very customarily been referred to earthquakes for their origin of late years; yet very many examples occur in which there has been no account of contemporaneous earthquake, either in the offing at sea, or in any other direction. And the question arises, are such abnormal waves always to be attributed to earthquakes (whether observed or not), or may they possibly be produced by some nodal action or other disturbance far out at sea of waves of other classes, and if so, of what nature?

It will be advantageous to adduce some examples, and the rather, as I am enabled, through the obliging attention of the Commissioners of Public Works in Ireland, to state one of much interest and in some detail, of which no full account has yet appeared.

But first we may notice such an occurrence on the coast near Whitby, Yorkshire, copied from the York 'Herald' of March 8, 1856, for which I am indebted to Mr. William Gray of York.

" York, March 8, 1856.

" Robin Hood's Bay.—On Sunday last, the 2nd instant, at 10 A.M., the tide being then about two-thirds flood, the following phenomenon was observed:—The rocks, which had been bare just previously, were observed to be completely submerged. The water then fell back, and again returned, rushing with considerable force over the rocks and beach. This was repeated two or three times, the water running up a moderately inclined beach the distance of thirty yards.

" A remarkable phenomenon of the tides was observed at Whitby on the 2nd inst. At a quarter to ten o'clock in the morning, being an hour and a quarter before high water, the sea suddenly rushed up Whitby harbour, rising in different places from 18 inches to 3 feet, driving a laden lighter from its moorings, and causing much commotion amongst the small craft. It then receded, but was followed by other and similar waves, so that the tide appeared to ebb and flow six times in the space of little more than an hour. A vessel, which was entering the harbour at the time, was alternately afloat and aground on her passage up, according to the level of the water. About midnight of the same day, the harbour-officers observed a recurrence of the event, and in the first hour of Monday the rush of water appeared to be much more powerful than on Sunday morning. About eleven o'clock on Sunday night, Mr. Tose, the harbour-master, having observed a mark which indicates that the tide was sufficiently high for a vessel then in the roads to enter the harbour, went up the lighthouse and lit the gas-signal. On his return to the pier, he was astonished to find that though the tide ought to have risen higher, it had fallen considerably below the mark. Being afraid the vessel would take the harbour, he was about to extinguish the light, when suddenly the tide rose far above the mark above referred to. At Staithes and Robin Hood's Bay, the phenomenon was also observed. The rushes of water resembled what are known in some rivers as 'bores,' but on a much larger scale. Such phenomena often accompany subterraneous disturbances, and on some occasions they have been terribly destructive. As no earthquake has been felt in these parts recently, it is difficult to account for the phenomenon, and it can scarcely be referred to atmospheric causes. It would be interesting to learn whether a similar occurrence took place on other parts of the coast. Dr. Young, in his 'History of Whitby' (page 792), remarks, 'To volcanic

agency may be ascribed this remarkable phenomenon, that on the 17th July, 1761, the tide rose and fell at Whitby four times in an hour."

Analogous phenomena have been observed at Pegwell Bay, on the southern coast, during the present year.

The following documents refer to the observations of such waves made upon the coast of Wexford, Ireland, in 1854.

The 'Wexford Independent,' a local journal of the 27th September, 1854, gives the following account:—

"Extraordinary Phenomenon.—We are indebted to Mr. William Campbell, the professional helmet-diver, who has done so much for the improvement of the new pier of Kilmore, by blasting and removing the rocks which impeded its entrance, for the following account of an extraordinary phenomenon, witnessed there on Saturday evening, Sept. 16th, 1854. 'I was' (writes Mr. Campbell) 'in one of our boats seeking after some implements, and not looking seawards, when, on a sudden, I heard a mighty rush of water against the back of the pier, and in a moment it came sweeping round the pier-head, full 3 feet high and abreast. It was within one hour and a half of low water at the time. The inner dock was crowded with the small sailing craft of the place, and quite dry, the tide being more than four hours on ebb. In less than five minutes every boat was afloat, and we had high water. In five minutes more the water ebbed again to the lowest spring-tide. This was repeated seven times in the course of two hours and a half. St. Patrick's Bridge was alternately dry and covered to the extent of a mile, and the sea formed a cascade from end to end of it, the influx appearing to come from the east. At the same time the sea was not by any means rough nor heaving. Standing on the top of the parapet wall of the pier, I could descry two different currents running parallel, and counter currents to these quite visible, the discoloured water running east at a rate of ten or twelve miles an hour, and the intervening water of the original green hue, and stationary. These tide currents were as far out as the shore of the Saltee Islands. I can only compare the current to the opening of a sluice gate. There was no damage done to any of the craft, more than the bursting of a few warps. Had the occurrence taken place at the period of high water, the result would have been the complete overflow of the land in the district, and consequent immense loss. We have often heard old people of that place say that on the Sunday after Lisbon was destroyed by the earthquake of November 1, 1755, the day being remarkably fine, the sea at Kilmore suddenly rose and fell in like manner. This occurrence the other day has been owing, no doubt, to some similar and distant cause.'"

The phenomena alluded to in the above paragraph, from the 'Wexford Independent,' are not unknown on the Waterford coast, and are there popularly termed 'death waves.' It is not very long since two ladies had a narrow escape of being washed out to sea at Dunmore, by a sudden wave, which surprised them whilst seated at a considerable distance above high-water mark on the beach.

Repeated instances are on record of such waves upon the north east coast of England and upon the south-west coast of Ireland, as well as in many other places (see also Second Report, p. 47-48), and even on the east coast of Africa.

For the following, I am indebted to the Commissioners of Public Works, Ireland:—

"Office of Public Works, October 19, 1854.

"SIR,—I am directed to transmit herewith a copy of a report which the Board have received from James B. Farrell, Esq., County Surveyor of Wexford, respecting an extraordinary tidal phenomenon at Kilmore on the coast of that county on the 16th ultimo. The Board send this report, considering it will be interesting to you, on the subject of earthquakes, to which you are giving your attention.

"To Robert Mullt, Esq."

"W. MOONEY, pro Sec."

"Wexford, October 10, 1854.—In compliance with the request of the Commissioners, contained in your note of the 22nd ultimo, I forwarded a newspaper in which was an account of the tidal phenomenon at Kilmore.

"Since then I have made inquiries along the coast, tracing from New Ross round by Ballyhack, Arthurstown, Duncannon, Hook Head, Slade, Fethard, Bannow, and on towards Carnsore Point.

"As far as Bannow nothing unusual was observed. The Coast-Guard near there,

although one was, as is customary, on the 'look-out' at the time of the occurrence, noted no disturbance. It appears to have been perceived about two miles east of this station, near the point indicated by the line A on the accompanying map, Plate XIII., and seems to have been confined between this and the line B. At 'Ballyhealy,' a little further east, it was not observed.

"From inquiries into the details of the appearance, I learned from Mr. Campbell at Kilmore, that six distinct ridges of water, about 2 or 3 feet high, passed from the west towards the east, very much discoloured and carrying with them large quantities of sea-weed. There was a considerable space between each pair in which the water was of its usual colour, and quite calm, as was the sea generally, there being no wind to disturb it.

"These ridges did not proceed in (broken?) waves, but in continuous lines, and passed on apparently unchecked, while the tide rose and receded on the shore within them, which it did seven times. It is stated that, at the second reflux, the water fell lower than it was ever known by the residents there to fall before.

"It would appear that the ridges maintained their velocity sufficiently to force back the ebb, which flows rapidly round Carnsore Point (nearly three knots an hour) until they passed St. Patrick's Bridge, where the ebb-tide regained its motion westward in the shape of the 'cascade' mentioned by Mr. Campbell in the printed account.

"The disturbance lasted, according to his statement, from 20 minutes past 4 to nearly 7 o'clock P.M.

"On inquiring at the 'Bar of Lough,' I found that at about half-ebb the watchman at the Coast-Guard Station, who was in the watchhouse, which is built on the edge of the sea, felt the floor tremble under his feet, and at the same time the fire-irons and other articles of furniture shook and rattled audibly. He was also startled by 'an extraordinary noise' outside. On going out to ascertain the cause, he found that a large wave was forcing back the ebb. This was repeated three times. The first wave only, however, was accompanied by noise.

"A schooner was lying inside the Lough, at the place marked C, from the master of which, I learned that his vessel was three times swung round, standing alternately to the flood and ebb. He was below, when he had the first intimation of it, and described his being affected with a strange sensation, as if he were getting sick. This I believe is not uncommon in cases of earthquake.

"Mr. Lett, R.N., the Coast-Guard officer here, upon whom I called, made to me a statement confirming what I had collected by inquiry.

"There seems little doubt that the whole thing was caused by a slight shock of earthquake.

"From the information I had at Kilmore from Mr. Campbell, I have laid down lines on the accompanying map, exhibiting the ridges as described by him, and endeavouring to illustrate, by the curved arrows, the action of the ebb-tide upon them.

"JAMES B. FARRELL, *Wexford County Surveyor.*"

"With reference to the communication addressed to you on the tidal action on Wexford coast, I may mention that since it was sent to you, further information shows that it extended beyond the limits marked by Mr. Farrell, having, by the report of the Coast-Guard, turned Carnsore Point: he has written to the Inspecting Commander of the Coast-Guard, to request he will follow it up, and ascertain how far north the effect was observed.

"Yours, dear Sir, faithfully,

"JNO. RADCLIFFE."

"To Robert Mallet, Esq.
21 Oct. 1854."

Referring to Plate XIII., it would appear probable that the primary cotidal line of these waves was about in the direction C C of the heavy dotted line, and that the change of direction, on approaching the shore about B, was due to the conjoint effects, of the meeting ebb tidal-stream round Carnsore Point, of reflection at the Saltees, and of inequality of bottom on reaching the inshore shoal-waters.

An almost identical train of phenomena occurred at the same point upon the Wexford shore on Sunday, 12th September, 1841. The account is given by Milne, "On British Earthquakes," Edinb. New Philos. Journ. vol. xxxvi. p. 83, and copied 1858.

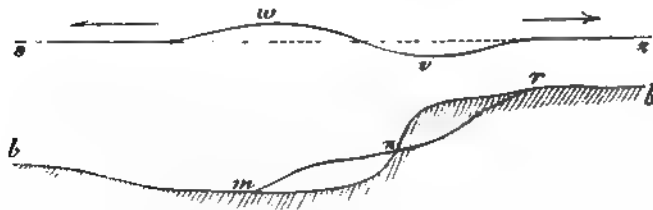
from a Wexford newspaper:—"The day was misty and dark, wind S.S.W. to S. Thunder heard at noon; wind lulled, and fog became dense. At Kilmore, ten miles south of Wexford, and directly opposite the Saltee Islands, about noon, a number of short, loud, smothered reports like cannon were heard. The tide had flowed considerably at the time, and the fishing-boats at the pier were all afloat, when, within the space of two or three minutes, the water suddenly receded from the pier, and people walked dry-shod where a little before there had been five to six feet of water. After a few minutes, again the tide began as suddenly to return; and, after resuming its level, continued to rise to high water in the usual way. There was no extraordinary commotion, only an increased surf. The sky cleared after thunder and showers."

The question, however, here chiefly in point is, whence come these waves? what is their origin? The direction of translation, on entering the wide Bay of Ballyteague, here was almost exactly from the south-west, and if transmitted from a considerable distance, the origin of disturbance must have been beneath the deep waters of the Atlantic Ocean, and it is scarcely probable that an earthquake blow sufficiently powerful to have originated waves so large after so long a transmission, should have occurred and not have been generally felt in the South of Ireland, where the hard and elastic characters of all the formations are so favourable to the distant transmission of impulses. It is equally difficult to assume, as here operative, a condition which upon coasts of shoal water and encumbered with banks and bars, may unquestionably originate great sea-waves, and which very probably is actually the cause of those of not unfrequent occurrence upon the east and south-east coasts of England.

Almost all great submarine banks are constantly subjected, at the same time, to aggregation by deposition, and to partial degradation, by the sweeping away of material along their bases and flanks, by tidal action, either constant or at certain periods of tide. Deposition takes place by vertical, or more or less inclined precipitation of suspended matter; this forms of degradation, by horizontal removal. The conjoint effect is very frequently to increase the steepness of the angle of slope of the degrading flank of the bank, matter being constantly added on top and removed from lower down, and with most energy at a level intermediate between the surface-water and bottom.

A time arises, therefore, at which the angle of slope of the bank is increased beyond the limits of repose of the material, whether mud, sand or gravel, or any mixture of these; and then a great under-water slippage takes place, and a mass often of enormous magnitude at once slides from the top and flank of the bank down into deep water, and spreads and levels itself out upon the bottom, to be in its turn swept away and replaced by fresh materials and to give rise to another slippage. Thus, in figs. 9 & 10, if s, s represent the surface of the sea, b, b (fig. 9) the sea-bottom in

Fig. 9.



transverse section through the flank of the bank in a plane at right angles to the stream of abrasion; then, at the point where the equilibrium of repose of the mass is lost, the mass r, n slips and is suddenly transported from its original position to n, m . The effect upon the surface of the sea, is at the same moment to originate a positive and a negative wave, w and v , whose crests shall more or less approximate to the general line of the flank of the bank; and these will be immediately succeeded by two solitary waves of translation, a greater, w (fig. 10), and a less, v , whose motions of translation will be opposite.

The magnitude of the wave raised is dependent upon that of the mass of solid material that has suddenly changed its place, upon the depth of water in which the

Fig. 10.



slippage has occurred, upon the rapidity of the transposition, and in a minor degree upon the form and material of the portion of the bank that has slipped. Where the depth of water is very great, its effects at the surface may be quite insensible at the place; but when this low broad flattened wave of only a few inches becomes heaped up on shelving shores or tidal estuaries, it may then become very apparent, and perfectly so to accurate tide gauges. Where the water is comparatively shallow, as it usually is where large and heavy banks occur, there the undulatory effects on the surface, even at the seat of disturbance, will be considerable. We have then a simple mechanism abundantly sufficient to account for the occurrence of some such abnormal tide-waves or great sea-waves as have been noticed; but while thus a *vera causa*, is it *the* cause of any of those phenomena that have been observed, and which do not appear to have been accompanied by earthquakes? This, as well as all the hydrodynamic phenomena of such sea-waves, I would commend to the careful attention of future observers. (See First Report, p. 61.)

Stoppage of Rivers.—Throughout earthquake narratives, nothing is more commonly recorded amongst the secondary phenomena, than sudden derangements of the ordinary and prior regimen of springs, wells, and especially of rivers. Almost all such facts admit of simple explanation; and in the case of rivers, the sudden drying up or stoppage of their streams, has been most usually due to sudden damming up by the fall of *débris* of rocks from precipices, &c. across the river-beds, usually at narrow gorges, where the damming can easily take place, and whence it is, by the posterior rising of the waters, afterwards swept away or gradually removed by floods, &c.; often also on a grander scale, it arises from the occurrence of great landslips (in countries of deep alluvial or other little coherent formation), bulging out into the river-beds, and temporarily shutting them up, and either forcing the streams into new channels, or damming them up until the waters produce a debacle and sweep away the obstacle.

But not a few cases are upon record of sudden stoppages in the ordinary supply of water in river streams, not known to have been connected with any earthquake, or with any sufficient and explainable cause. Perhaps the phenomena cannot be more briefly set forth than by transcribing a notice from ‘Chambers’s Edinburgh Journal’ for Jan. 19, 1839, No. 364. p. 412:—

“Late Stoppage of Rivers in the South of Scotland.—Most of our readers have probably read the accounts which appeared in the newspapers of a simultaneous stoppage of the rivers Teviot, Clyde, and Nith, on the 27th of November last; yet, as many may not have heard of it, and few may have paid to it the attention which it deserves, we are glad to have the opportunity afforded us of bringing the circumstance under the especial notice of our readers. It has, we are glad to find, been taken up, as a subject worthy of scientific investigation; and in this we have been invited to assist, by endeavouring to procure information from any of our readers who may be able to afford it. The phenomenon, it is suspected, is attributable to some agent or cause which had acted over a very extensive range of country, and which, probably, produced similar effects, in many other places besides the banks of the three rivers above specified. We trust that if such effects were perceived by any of our readers, they will be so obliging as accede to the proposal and the request with which we conclude the present notice.

“On the morning of Tuesday, the 27th of November last, about six o’clock, the miller of Maxwellheugh Mill, situated on the Teviot, near its confluence with the Tweed, perceived a great diminution taking place in the water which flowed through his mill-course. At eight o’clock the water altogether ceased to flow. Thinking that the sluice had fallen down, or that the *cauld* [dam] had given way, he went up

to the canal, and found, much to his surprise, that there was hardly any water in the river. There were here and there a few pools, where there were hollows in the channel; but there was no longer a running stream. The channel continued dry for four or five hours—after which the water began gradually to flow, till the waters reached the same level they were at previously. At this place the Teviot is on an average about 50 feet wide, and 2 feet deep.

"The same phenomenon took place in the Nith, in the parish of Durriadeer, at Enterkinefoot. The channel was so dry, that a person could have walked across without wetting his stockings.

"It was observed also in the Clyde, a little above New Lanark. The extensive cotton-mills at that place were for some hours stopped, in consequence of an entire cessation of the current. Numbers of fish were caught with the hand, and many persons walked across without wetting so much as the soles of their feet.

"The above particulars we have taken from the newspapers, and we do not vouch for their perfect accuracy; but we have no reason to doubt it, as the statements have not been contradicted.

"It appears that the same phenomenon has occurred frequently before. In the Teviot, it is known to have occurred at least five times between the years 1748 and 1787. It happened also in the Clyde in the year 1787, and within a few days of its occurrence in the Teviot. and it is remarkable, that, in regard to both of these rivers, the part of the channel where their waters disappeared, turns out to be the very place where they disappeared last month. But there are several other rivers, both in England and in Scotland, where the same phenomenon has been observed within the last half-century.

"We feel satisfied that our readers will share with us an extreme anxiety to discover, if possible, the cause of this singular phenomenon: and we will now explain to them in what way they can be instrumental in assisting in this discovery.

"The first object should be to obtain a minute and accurate account of all the facts apparently connected with the phenomenon, at the places where it was observed. We are happy to learn that steps have been taken for this purpose by persons well-qualified for such an inquiry. But as it is just possible, that even they may not have gathered up all the circumstances calculated to throw light on the subject, our readers in these quarters would do well to note down, ere it fades from their memories, any thing particular which they observed.

"We may now allude to the different theories which have been started to account for the phenomenon, because they will immediately show the importance of gathering together as many facts as possible. It is by facts alone that these theories will be confirmed or refuted.

"Some persons ascribe the phenomenon to a severe frost which occurred on the morning of Nov. 27, and which, it is said, froze up the streamlets and springs that supplied the rivers where the phenomenon was observed. We cannot see how, on any philosophical principles, the effect here stated would follow from such a cause. But, even if it were sufficient to produce it, then the same phenomenon should have occurred in the Tweed, the Jed, and all the rivers where the frost reached. Moreover, it should be observed every winter, and it ought to have been very strikingly observed last winter. Besides, the waters should, after the frost gave way, have risen considerably above their usual level, which, it is said, was not the case.

"We have adverted to these inferences from the theory just mentioned, in order to show how its truth or falsehood may be tested; and many of our readers may be in possession of facts which will supply this test.

"Another theory has been proposed, which, we confess, appears much more probable. It is suggested, that a fissure may have been formed under or across the channels of the above rivers, into which their waters found their way. The current would thus cease to flow in its ordinary channel until the fissure closed, or was filled up by the sediment and water poured into it. The fissure might be either a crack across the country, or a local sinking of the ground. It is well known that earthquakes frequently produce such effects; and there are few years in which, in some parts of Scotland and England, the shock of an earthquake is not felt. When the Clyde stopped in January 1787, a rivulet in the parish of Strathblane, in Stirlingshire, which drove a mill, also disappeared. On the same day, the shock of an

earthquake was very sensibly felt in Glasgow and its neighbourhood. Whether or not at either of these places any fissures were observed, into which the streams flowed for a time, we have been unable to learn. That there are fissures, or *slips* (as the geologists call them), which everywhere intersect the crust of the earth, is well known to every collier and miner; and that there are such fissures in that part of the channel of the Clyde, where its waters have repeatedly disappeared (namely, between the uppermost fall and Corra Linn), is extremely probable. It might be thought, however, that, if a crack was produced, sufficient to allow the waters of a large river to escape, it would soon be discovered. But it is quite possible, that, after the lapse of a few hours, the crack might close again, and leave scarcely any external traces of its existence. Still, we cannot help thinking that some traces should be discoverable; and this is just one of the points on which our provincial readers may be able to afford information.

“ We shall conclude by suggesting one or two points, to which, if any of our readers would be so obliging as to investigate the subject, their attention may be directed; and we doubt not, other points will occur to themselves :—

“ 1. Have phenomena, similar to those which occurred in the Teviot, the Clyde, and the Nith, on the 27th of November last, been observed, on the same day, or about the same time, in any other rivers in Great Britain?

“ 2. If so, at what hour were they first observed, and how long did they continue?

“ 3. Where is the highest place, in the course of the river, where its waters disappeared?

“ 4. Was any crack, or fissure, or sinking, or disturbance of the ground, visible at that place?

“ 5. Was the shock of an earthquake felt, anywhere, about the period above mentioned?

“ 6. Was there much or any ice on the river, or its tributaries, where the aforesaid phenomenon occurred?

“ 7. When the water began to flow again, did it rise to a higher level than it had been at previously?

“ 8. Is there any appearance of a slip, fault, dyke, or trouble in the strata, at or near the place where the waters began to disappear?

“ 9. Has this phenomenon, or anything similar to it, been observed in former years—and when?

“ We may also repeat the queries 3, 4, 5, 6, 7 and 8, with regard to the stoppage of the Teviot, Clyde, and Nith; for on the subjects of those queries with regard to the phenomenon of the 27th of November, we are as yet uninformed.”

See also some analogous facts mentioned by Perrey in his memoir “ On the Earthquakes of Europe, and adjacent parts of Africa and Asia, from 1801 to 1843 ” (Comptes Rendus, Sept. 1843, last page but one of the memoir). Most of these phenomena have occurred in the winter and in higher latitudes; and although there are considerable difficulties in the way of the frost theory of accounting for them, and I incline to the view that it will hereafter be found to be the true one, yet there is sufficient to induce the question—Can it be *possible* that partial or local elevations, with or without fractures or earthquake, take place occasionally, and to such an extent as to change the levels of portions of the earth’s surface, and for a time derange the flow of rivers, or other such main channels of drainage?

Those who embrace the views of Von Buch and Humboldt, &c., and admit the possibility of *boursoufflé* domes of trachyte, will be prepared to find no difficulty in imagining such comparatively small surfaces elevated and swollen up, by the assumed elastic forces beneath, so as to produce new and extemporaneous water-sheds; and although I cannot join in such views, the subject appears to me worthy of more examination at the hands of Vulcanologists and Seismologists.

Nausea at the moment of shock.—This curious effect of earthquake shock upon human beings, and if accounts are to be credited, also upon some domestic animals, is deserving of more attention than it has yet received.

The fact itself, as respects human beings, admits of no doubt. I have direct testimony of the boys of a large boarding-school being suddenly awakened at night by one of the North American shocks, and the greater number suffering from imme-

diate sense of nausea, amounting to vomiting in many cases. In the late earthquake at Naples (Dec. 1857) many instances were related to me by the sufferers. The question arises, is the nausea an effect of the sudden disturbance of the nervous system by alarm, &c., or is it due to the movement itself, and analogous to sea-sickness? There are great difficulties in the way of either solution. Those most likely to suffer severely from nervous alarm, do not seem to be those most usually affected. The direct movements are very generally too sudden, sharp, and of too little duration, to admit of the second explanation. The facts, however, require to be more numerous, and to be scientifically collected and classified as soon after the occurrence as possible, and are commended to such physiologists as may be favourably circumstanced for the observation in earthquake regions.

Indirect estimation of the force due to the shock.—In our ignorance of the precise nature of the originating impulse, whether of one or of more than one sort, or of the degree of force at the centre of impulse necessary to transmit a wave, sensibly, to a given distance through the common formations of the earth's crust, any trustworthy observations, of the distance to which the very analogous blow produced by fired mines, or other masses of gunpowder, has been sensibly conveyed, are not to be at present neglected. The 2nd Report gives exact information as to the distances to which such impulses from fired powder, even of a feeble character, may be conveyed through the worst conducting material (sand), and made instrumentally sensible.

I have collected since that period a few occasional notices of the explosions of large masses of gunpowder, and of such facts as may be found, of the magnitude and distance of the impulse conveyed, which I here transcribe for reference. It would be very desirable that officers of engineers entrusted with demolitions, or requiring to explode very large masses of powder, would endeavour to provide for obtaining observations as to the precise radius of the superficial area at which the ground shock became insensible without the aid of instruments, and that such observations were accompanied by a general account of the nature of the geological formation, and of the physical features of the country around.

"The Monster Blast at Furness.—The monster blast of gunpowder at Furness Granite Quarry took place on Wednesday afternoon, with complete success. The charge consisted of no less than three tons of gunpowder, and was deposited in two chambers—one and a half ton in each. The shaft was 60 feet in depth, and the chambers in which the powder was placed were 17 feet long. The charge was ignited by a galvanic battery, and lifted an immense mass of rock, computed to have been between 7000 and 8000 tons. The flame belched out on the seaward side, and was well seen by a large concourse of spectators from Iwerary, the watering places of the Clyde, and a party of excursionists from Glasgow, on board the 'Mary Jane.' The report was not loud, but deep and hoarse, and the ground in a very wide circle was strongly agitated."—Glasgow Constitutional, October 5, 1852.

The 'Journal de Turin' of the 29th ult. has, under the head of "latest intelligence," the following paragraph:—"TURIN, 11.45 A.M. Two successive shocks have been felt like those of an earthquake. The powder magazine of Borgo Dora has exploded. The population is hurrying to the scene of disaster. The rappel is being beaten. All the faubourg is on fire. A barrack has fallen down. Two hundred deaths are spoken of."—Saunders's Newsletter, May 1852.

It is quite probable that both in this case and in that of the magazine at Mayence, which subsequently exploded, information might still be obtained as to the weight of powder fired and the extreme distance to which the shock was felt.

"Improvement of the Port of Brest.—The 'Monteur de la Flotte' states that M. Verrier, engineer, charged with the work of clearing away the Rose Rock, which obstructs the entrance of a part of the harbour of Brest, called the Penfield, made an experiment a few days ago, which was perfectly successful. One of the convicts, covered with a diving-dress, descended to the rock at half-tide, and deposited a box full of gunpowder, to which were fitted two gutta-percha tubes, also similarly filled. As soon as the man had come up, a light was applied to the tubes, and shortly after a loud cracking noise was heard, and a large column of water, with fragments of stone and a quantity of sand and mud, were thrown up to the height of 20 feet. The commotion was so great, that the Bastion de la Rose, which stands near,

trembled to its foundation. The mass thus moved has been considerable."—Times, April 17th, 1857.

The following is the 'Times' account of one of the explosions at the siege of Sebastopol :—

"Thursday, Aug. 30, 1855.—The whole of the camp was shaken this morning at 1 o'clock by a prodigious explosion, which produced the effects of an earthquake. A deplorable accident had occurred to our gallant allies as they were pursuing their works with accustomed energy. A tumbrel, from which they were discharging powder into one of the magazines near the Mamelon, was struck by a shell from the Russian batteries, which burst as it crashed through the roof of the carriage, and ignited the cartridges within; the flames caught the powder in the magazine, and, with a hideous roar, 14,000 rounds of gunpowder rushed forth in a volcano of fire to the skies, shattering to atoms the magazine, the tumbrels, and all the surrounding works, and whirling from its centre in all directions over the face of the Mamelon and beyond it 150 officers and men. Masses of earth, gabions, stones, fragments of carriages, and heavy shot were hurled far into our works on the left of the French, and wounded several of our men. The light of the explosion was not great, but the roar and shock of the earth were very considerable. The heaviest sleepers awoke and rushed out of their tents. The weight of powder exploded was about seven tons, or 1400 rounds of 10lbs. each."—Times, Sept. 13, 1855.

The following is part of the French account of the expedition against Kertch :—

"May 26th, 1855.—Finally, before evacuating Yenikale, they blew up a powder magazine, containing about 30,000 kilogrammes of powder: the shock was so great, that many houses were destroyed, and vessels anchored ten miles out at sea felt it severely."—'Moniteur' quoted by 'Times,' June 1855.

And the following of the great explosion in the camp before Sebastopol, on the 15th of November 1855 :—

"Shortly after 3 o'clock on Thursday afternoon the whole camp, from Inkermann to far beyond Cathcart's Hill, was literally shaken throughout every square foot of its area, by the most tremendous explosion that has ever echoed through these Crimean hills. A greater quantity of gunpowder itself may have been exploded in some of the magazines discharged for the destruction of the buildings and works after the abandonment of the ruined city and fortress; but this is doubtful, and certainly there were never fired at the same time so great a number and variety of deadly and explosive projectiles. The force of the blow from the impelled air, the stunning noise, the flashing of the fire, the suffocating smoke, arrested every reasoning faculty, and took away all sense, save the instinctive impulse to fly from the source of evil. Among the regiments themselves of the light division, whether in tents or huts, a sudden sensation was felt as if of an upheaving of the ground, at the same time that a violent shock was experienced from the concussion of the air. Almost instantly followed the loud report of the explosion; not sounding as if a single charge or magazine had been fired, and without the ringing tone or decided character of a salvo of artillery; but seeming rather as if a number of magazines had been discharged, one after the other, so rapidly, that all the reports were blended into one. As the thunder of the first report subsided, its place was occupied by the sharp cracking sounds of shells bursting high in the air, the rush of fragments falling to the ground, and the loud bangs of shells which had been scattered and were exploding on all sides. Simultaneous with these, almost from the very commencement, was the crushing of wooden huts, splitting of timbers, and noise of falling glass from the broken windows. The tents were violently agitated, and sometimes the cords or poles were snapped asunder. Then followed a continued succession of minor reports, and the roar of flames, and crackling of burning wood, as the fire advanced and increased among the huts and artillery stores of the siege train dépôts. To say that it equalled in violence the combined salvos of a thousand parks of artillery might seem extravagant; and yet the simile would but feebly convey an idea of the volume of thundering sound that shook the earth for miles around, tearing down the most substantial masonry and wooden huts, and levelling tents as by the sweep of some invisible giant-arm. I had seen the explosions on and after the 8th of September, which so many pens have since described; but no half-dozen of them

together would have equalled this one, either in force or sound. Over an area of nearly half a mile from the spot of its occurrence, the air was one huge column of powder smoke and cast-up earth, up into and athwart which ignited or exploding shells and rockets ever and anon darted and flashed by hundreds, spreading destruction to nearly everything animate and inanimate, within a radius of more than a thousand yards. Heavy siege guns were wrenched from their carriages and thrown many perches from where they had been standing, whilst the carriages themselves were torn asunder."—*London Express*, Nov. 29, 1855.

The following notices of the Great Blast at Seaford Cliff are extracted from 'Saunders's Newsletter' of September 15, 1856:—

"The great explosion at Seaford.—There has been a great concourse of visitors in this little town today to witness the operation of 'blasting,' by the explosion of gunpowder, an immense mass of chalk cliff from the heights down upon the beach, there to form a barrier which may check the drifting of the shingle towards Beachy Head and the east. The ground about Seaford for two miles to the west lies low, and there is nothing to protect it from the inroad of the sea at high tides but a narrow beach bank of shingle. This barrier is becoming gradually weaker in consequence of the tendency of the shingle to drift away, and it has become a matter of urgent moment that this should be stayed. Close to Seaford, on its eastern side, rises a noble line of cliff, in some places 300 feet high, and averaging above 200. It was determined to project a huge slice of the cliff on to the beach, with a view thereby to constitute a groin for the purpose of retaining the shingle and preventing its leaving the bay. The operations have been conducted by the Board of Ordnance. The spot selected is not much above half a mile to the east of Seaford. At a height of about 50 feet above high-water mark there was driven into the cliff, or excavated, a tunnel or gallery 70 feet long, 6 feet high, 5 feet broad, ascending with a slope of 1 in 3. At the inland extremity it turned right and left in the heart of the cliff, above 50 feet one way and above 60 the other, with a more gentle ascent, the two smaller galleries being 4 feet 6 inches high, and 3 feet 6 inches broad, and the three being in the form of a capital T. At the utmost end of each of the side or cross galleries was a chamber, 7 feet cube, lined with wood; and in each chamber a charge of no less than 12,000 lbs. of gunpowder was deposited; making the distance of the centre of the charge 70 feet from the face of the cliff towards the sea, and about 70 feet above high-water mark. The galleries were 'tamped,' that is, stopped up, with bags of sand, and chalk in bags and loose, to within 50 feet of the mouth, both branches being tamped up, and 20 feet down the large gallery. It was not till 12 minutes past 3 o'clock, that suddenly the whole cliff, along a width or frontage of some 120 feet, bent forwards towards the sea, cracked in every direction, crumbled into pieces, and fell upon the beach in front of it, forming a bank down which large portions of the falling mass glided slowly into the sea for several yards like a stream of lava flowing into the water. The whole multitude upon the beach seemed for a few moments paralysed and awe-struck by the strange movement, and the slightly trembling ground; everyone sought to know with a glance that the mass had not force enough to come near him, and that the cliff under which he stood was safe. There was no very loud report, the rumbling noise was probably not heard a mile off, and was perhaps caused by the splitting of the cliff and fall of the fragments. There seemed to be no smoke, but there was a tremendous shower of dust. Those who were in boats a little way out state that they felt a slight shock. It was much stronger on the top of the cliff. Persons standing there felt staggered by the shaking of the ground, and one of the batteries was thrown down by it. In Seaford, too, three quarters of a mile off, glasses upon the table were shaken, and one chimney fell. At Newhaven, a distance of three miles, the shock was sensibly felt. The mass which came down is larger than was expected; it forms an irregular heap, apparently about 300 feet broad, of a height varying from 40 to 100 feet, and running 200 or 250 feet or more seaward, which is considerably beyond low-water mark. It is thought that it comprises nearly 300,000 tons."

These meagre and most imperfect accounts, as respects the object here in view, will however, it may be hoped, direct future attention to more precise observation of the data required.





art B

Unit 1

1700

1600

1500

1400

1300

1200

1100

1000

900

800

700

600

500

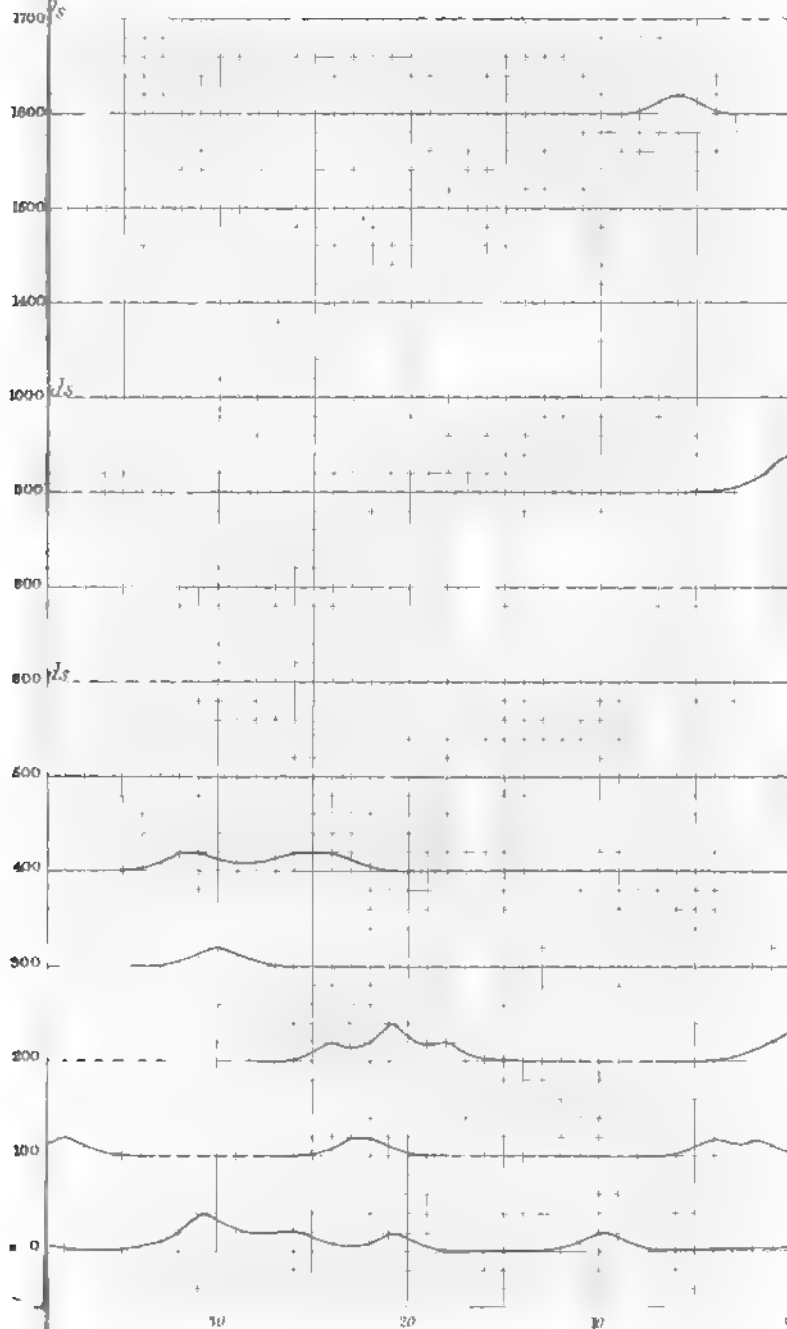
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300

200

100

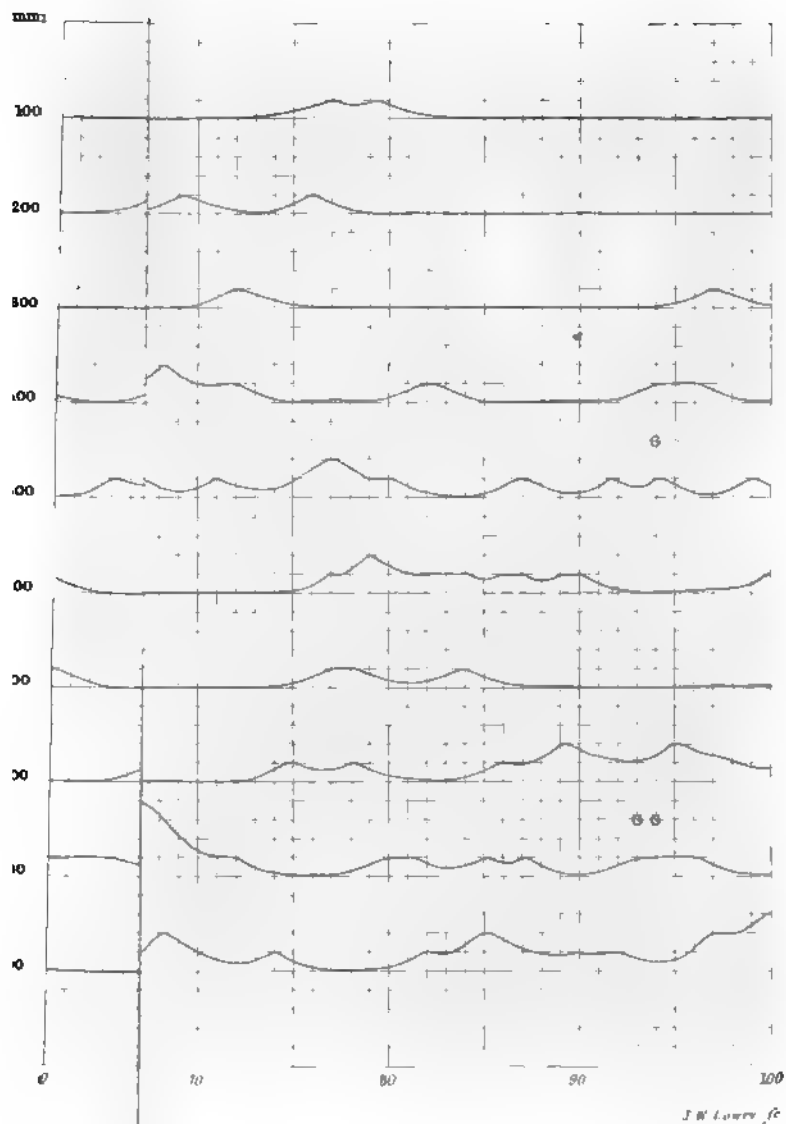
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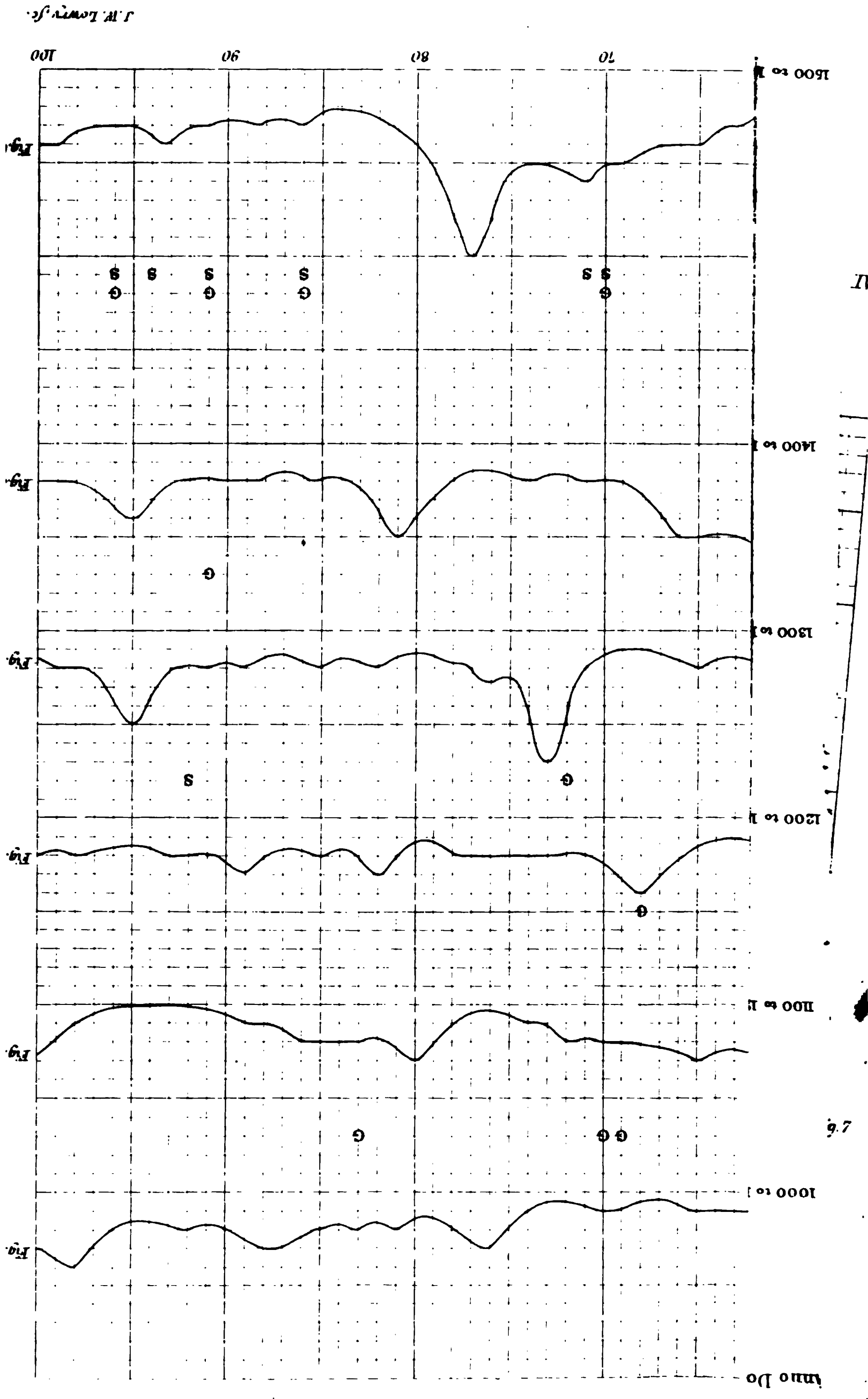
1700 1600 1500 1400 1300 1200 1100 1000 900 800 700



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J. W. Lowry, Jr.



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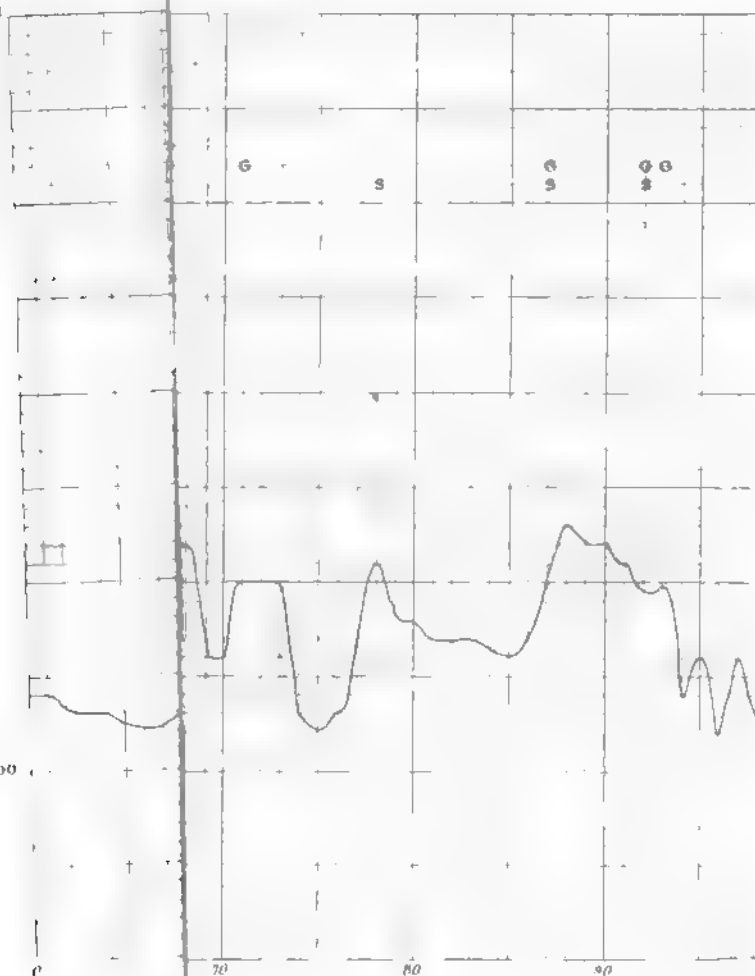
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Report First Assoc 1898

Plate

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1700



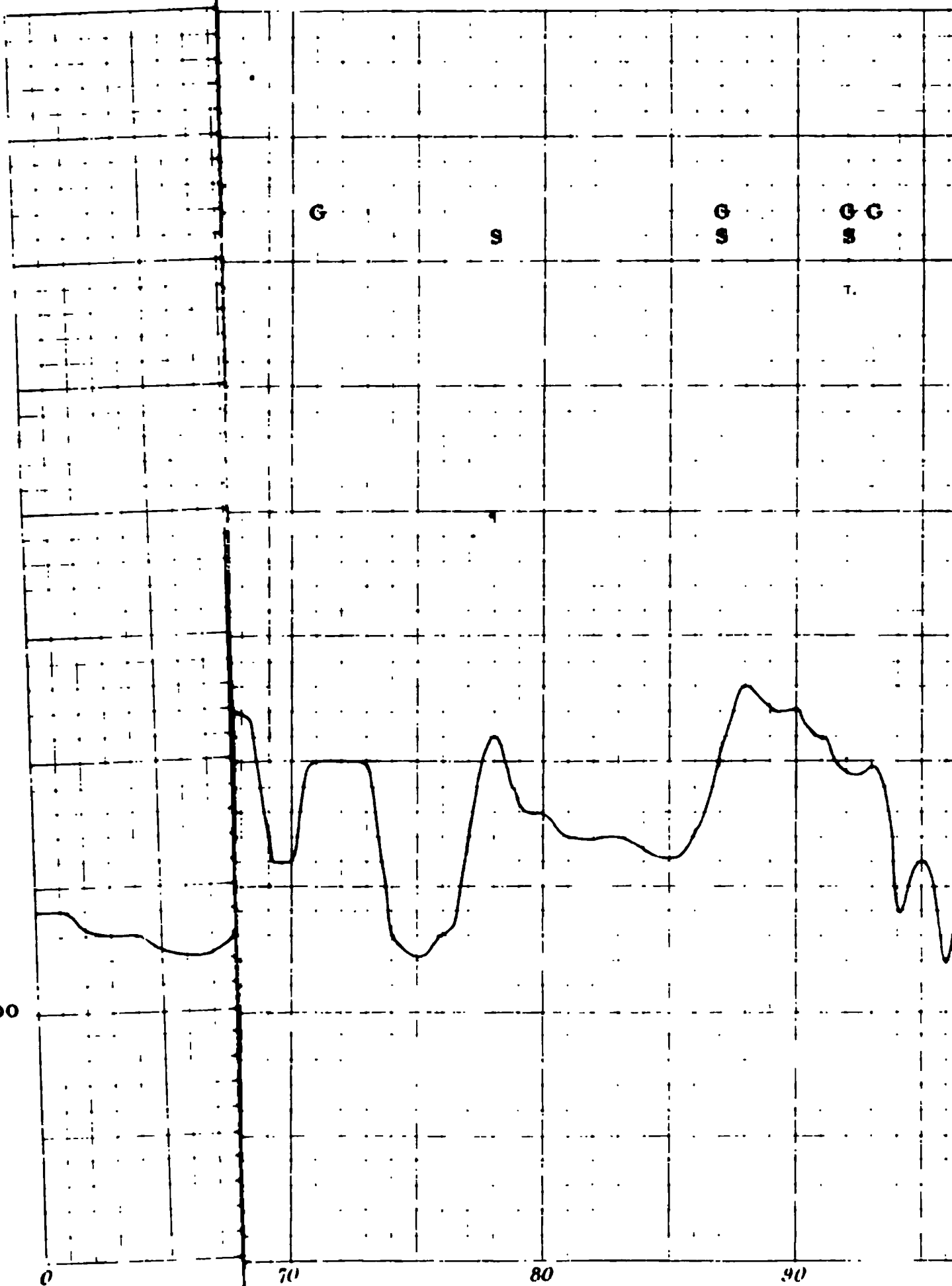
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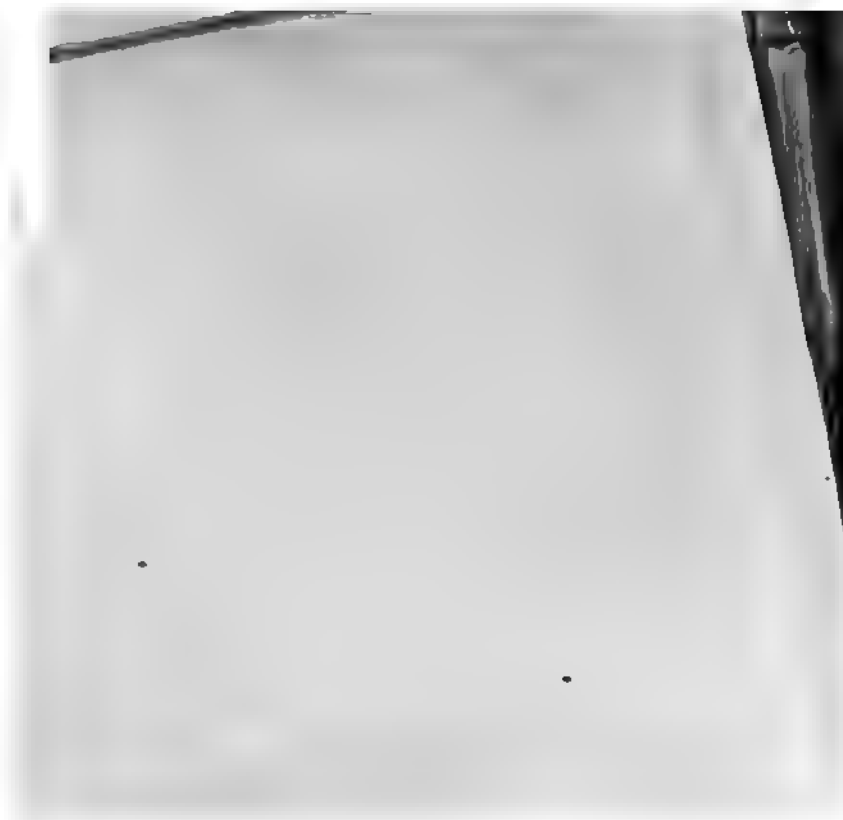


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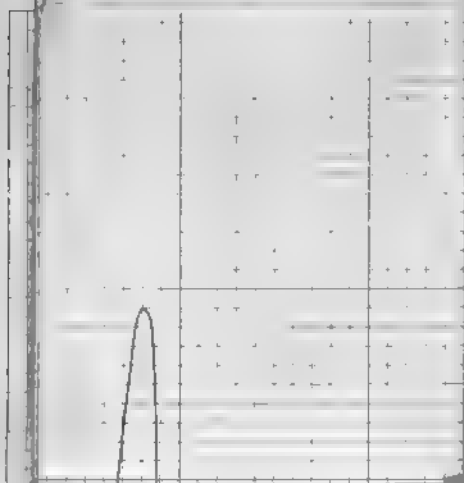
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Time

1000





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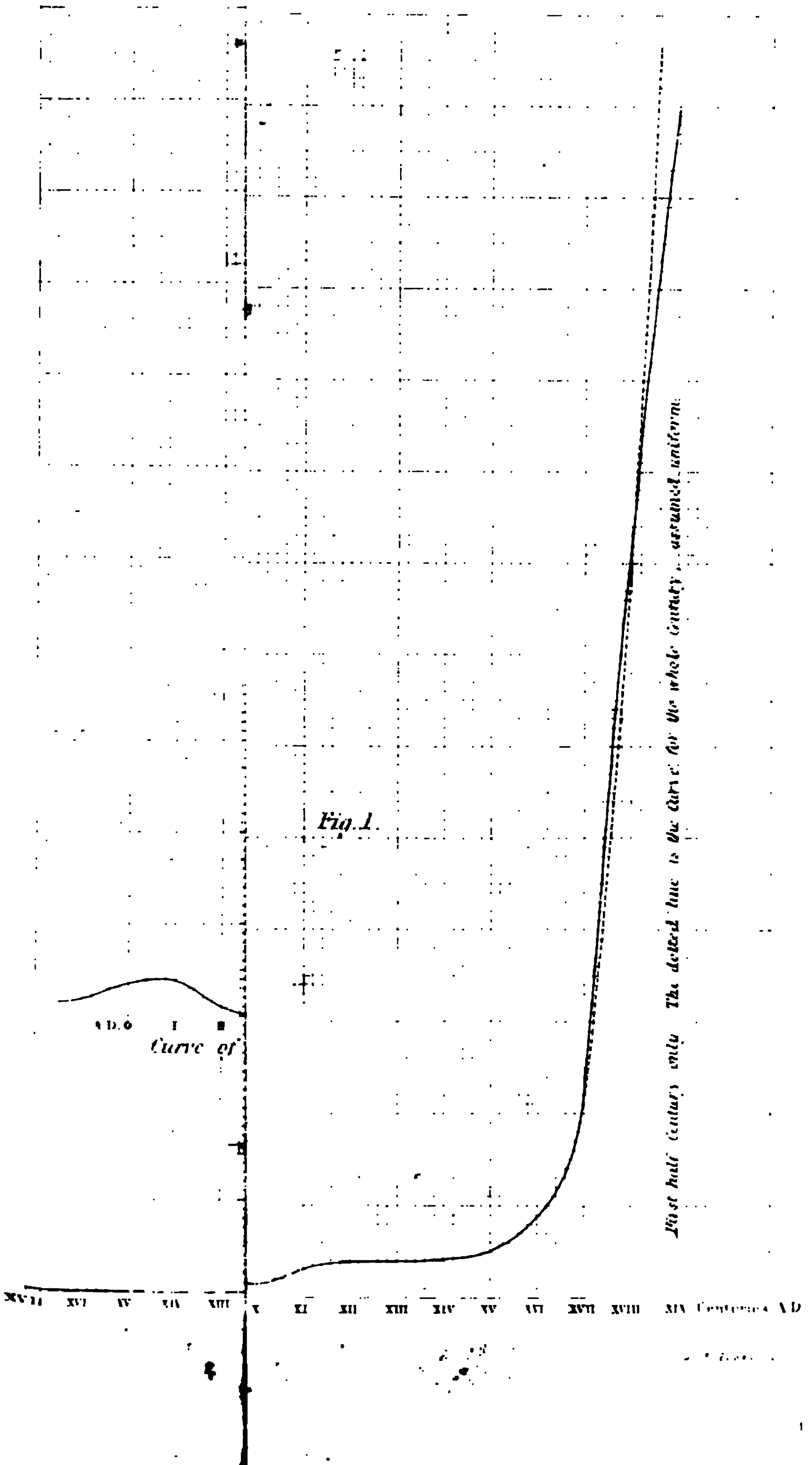
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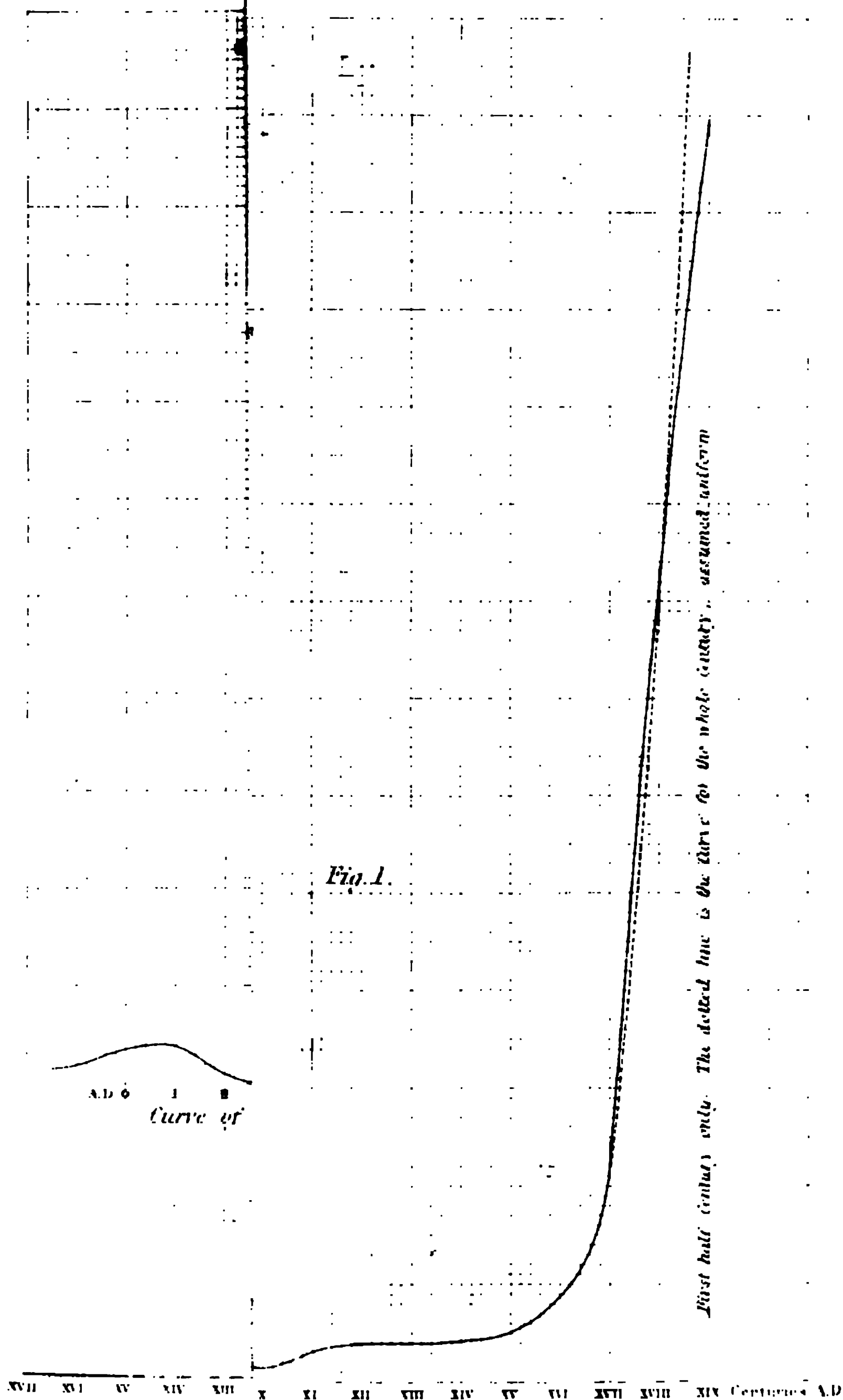
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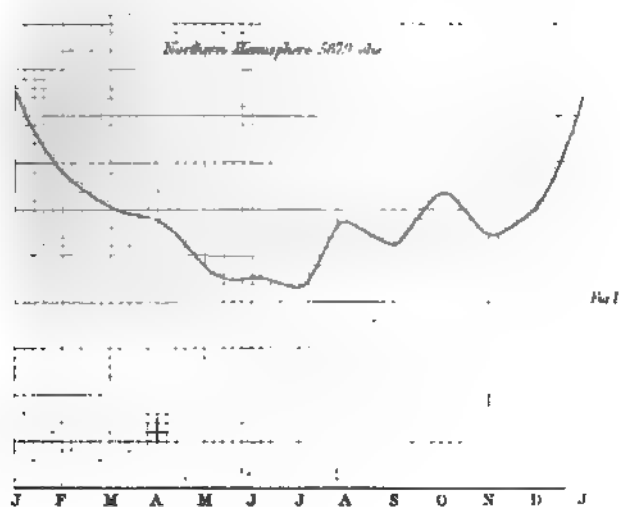
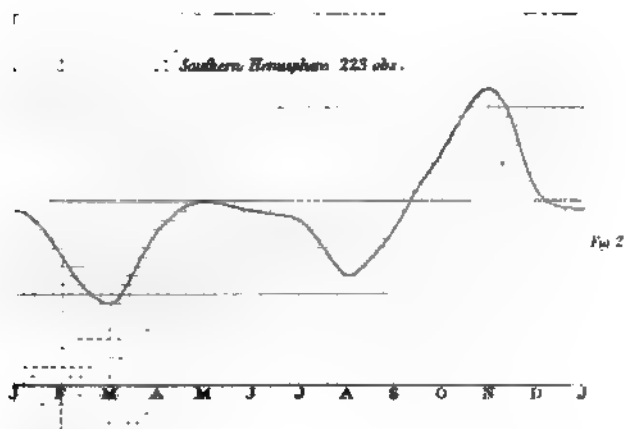




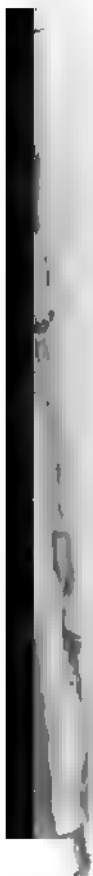


Distribution in Time

*Curves of Monthly Seismic Energy
from the entire Period*



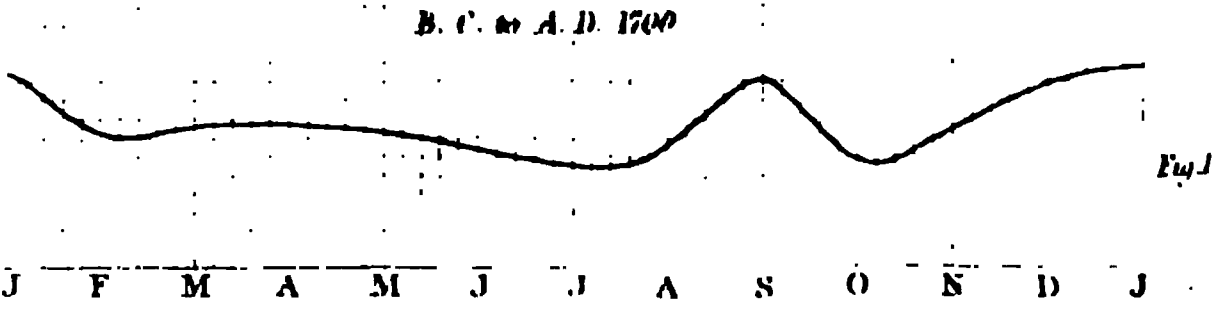
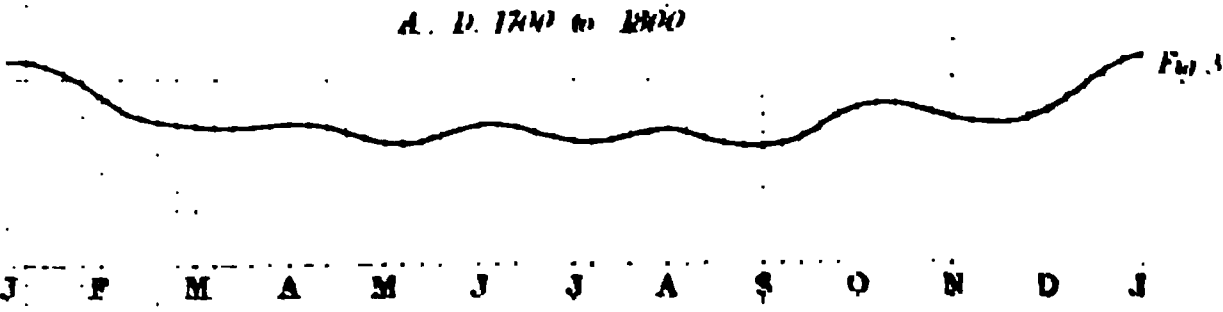
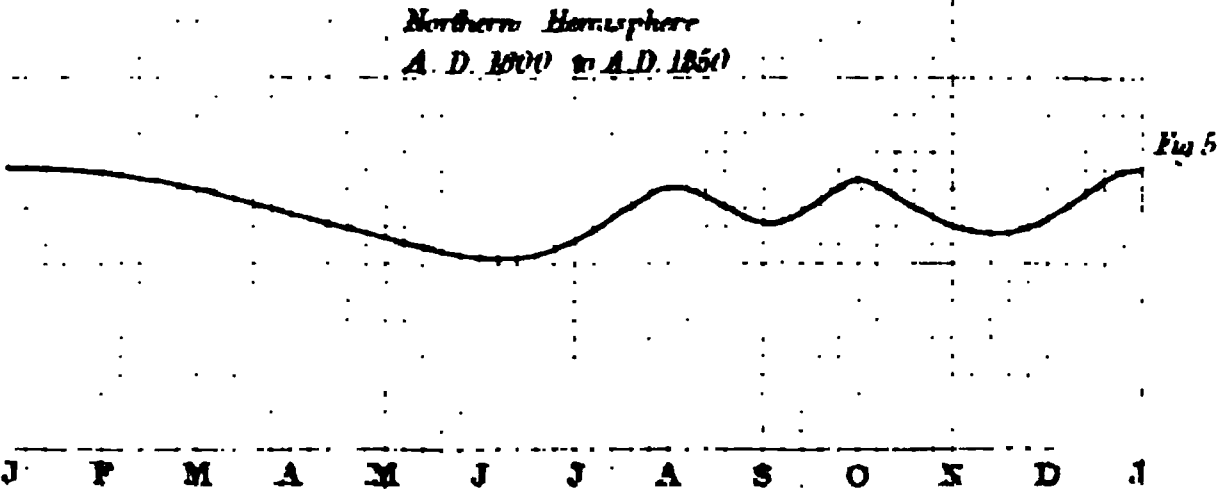
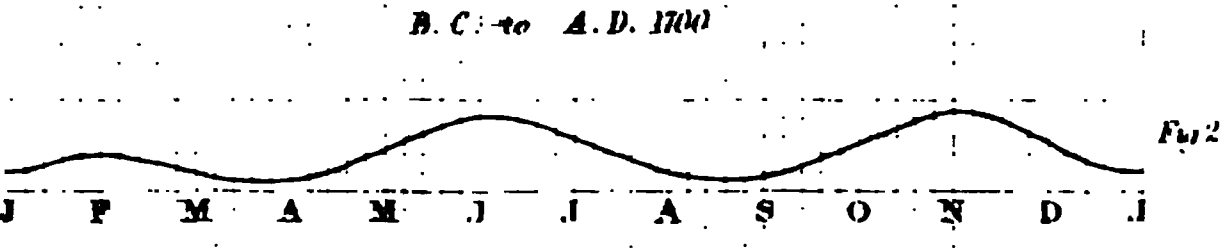
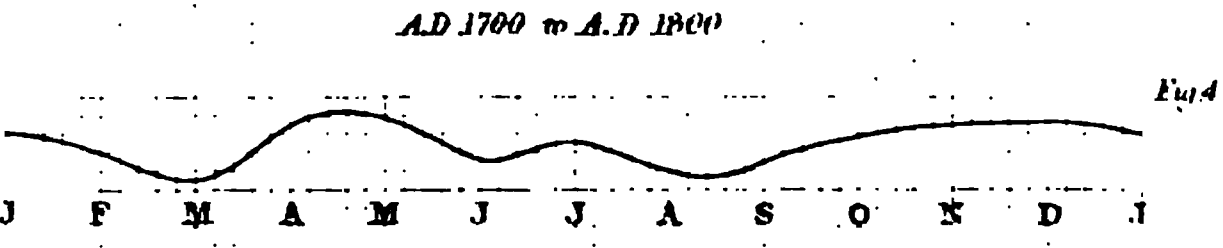
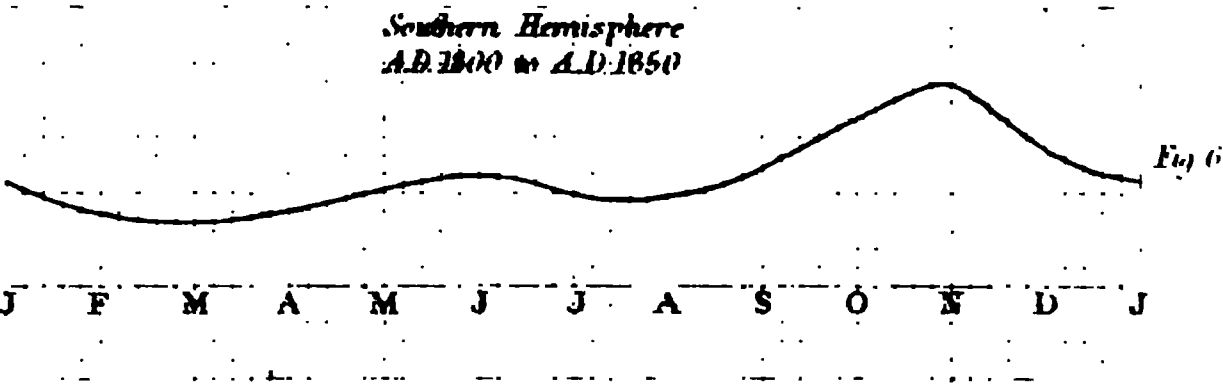
Vertical Scale is that of Fig. 2



Distribution in Time

Mensual curves of Seismic Energy

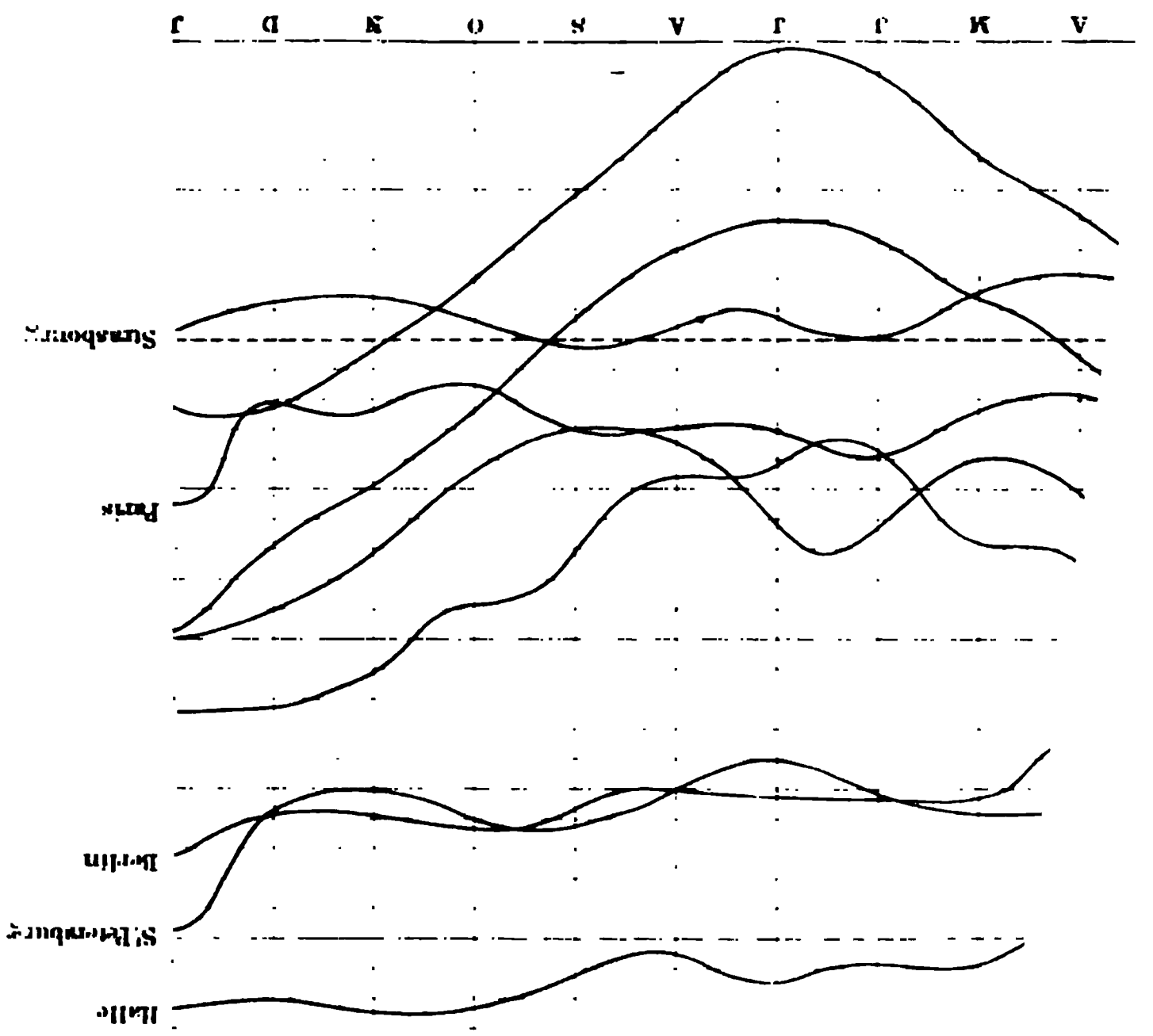
For corresponding periods. Northern & Southern Hemispheres.





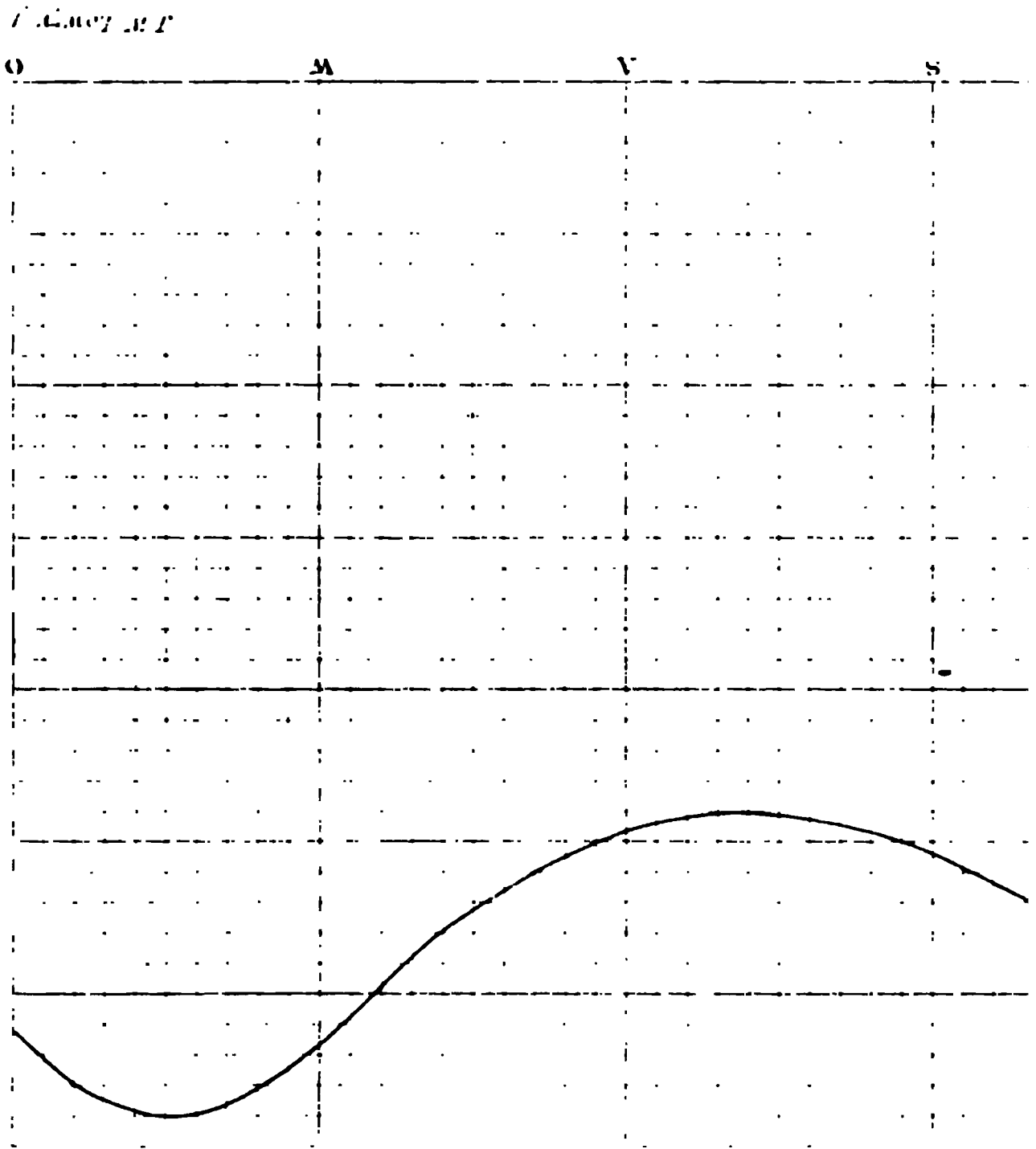
Distribution in Time.

Barometric Pressure, at different latitudes



and Solstitial curves of comparative seismic Energy

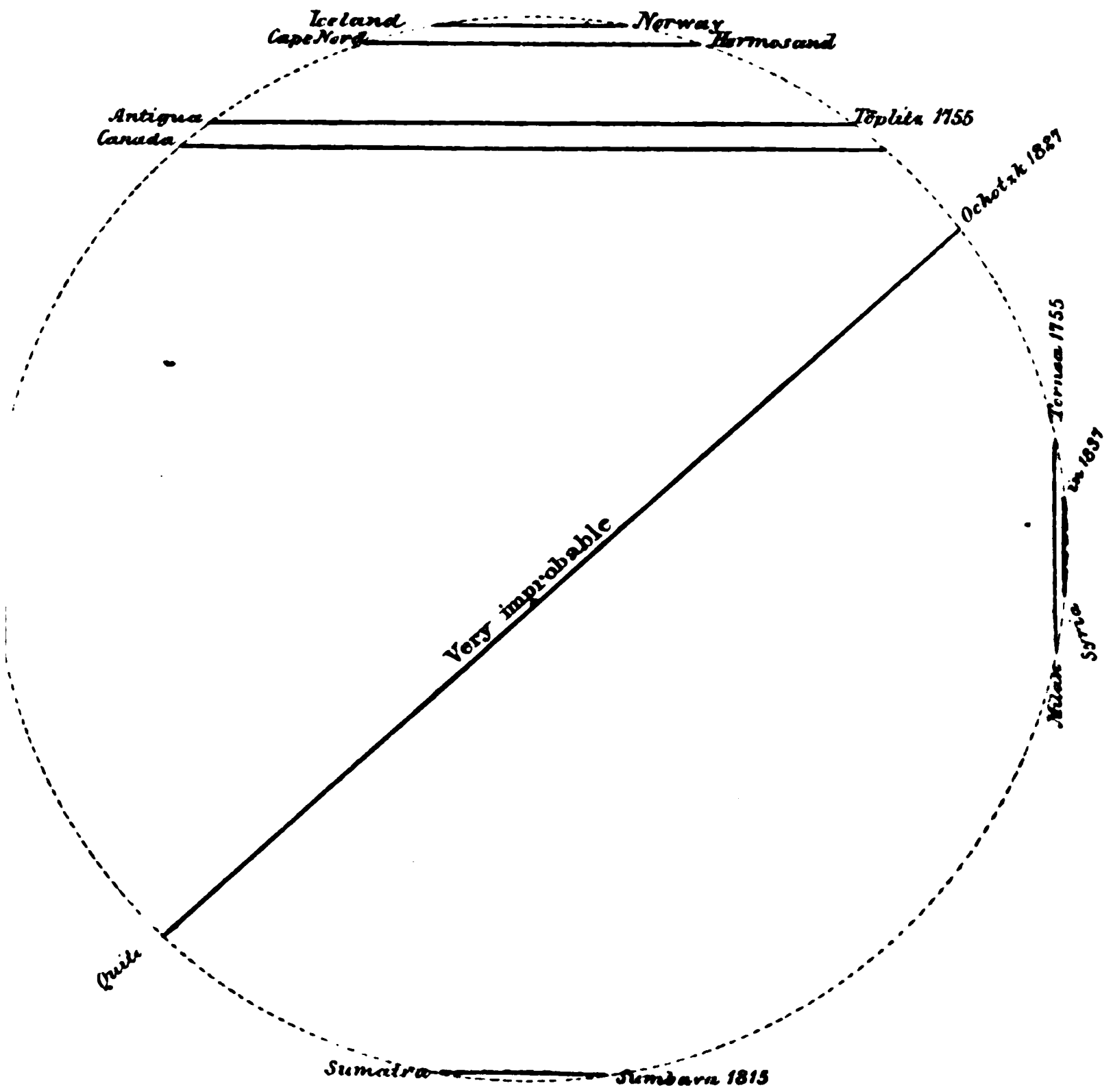
For the whole period and for both Hemispheres.



J. H. Lowry



SEGMENTS APPARENTLY CUT OFF BY SOME GREAT EARTHQUAKES.



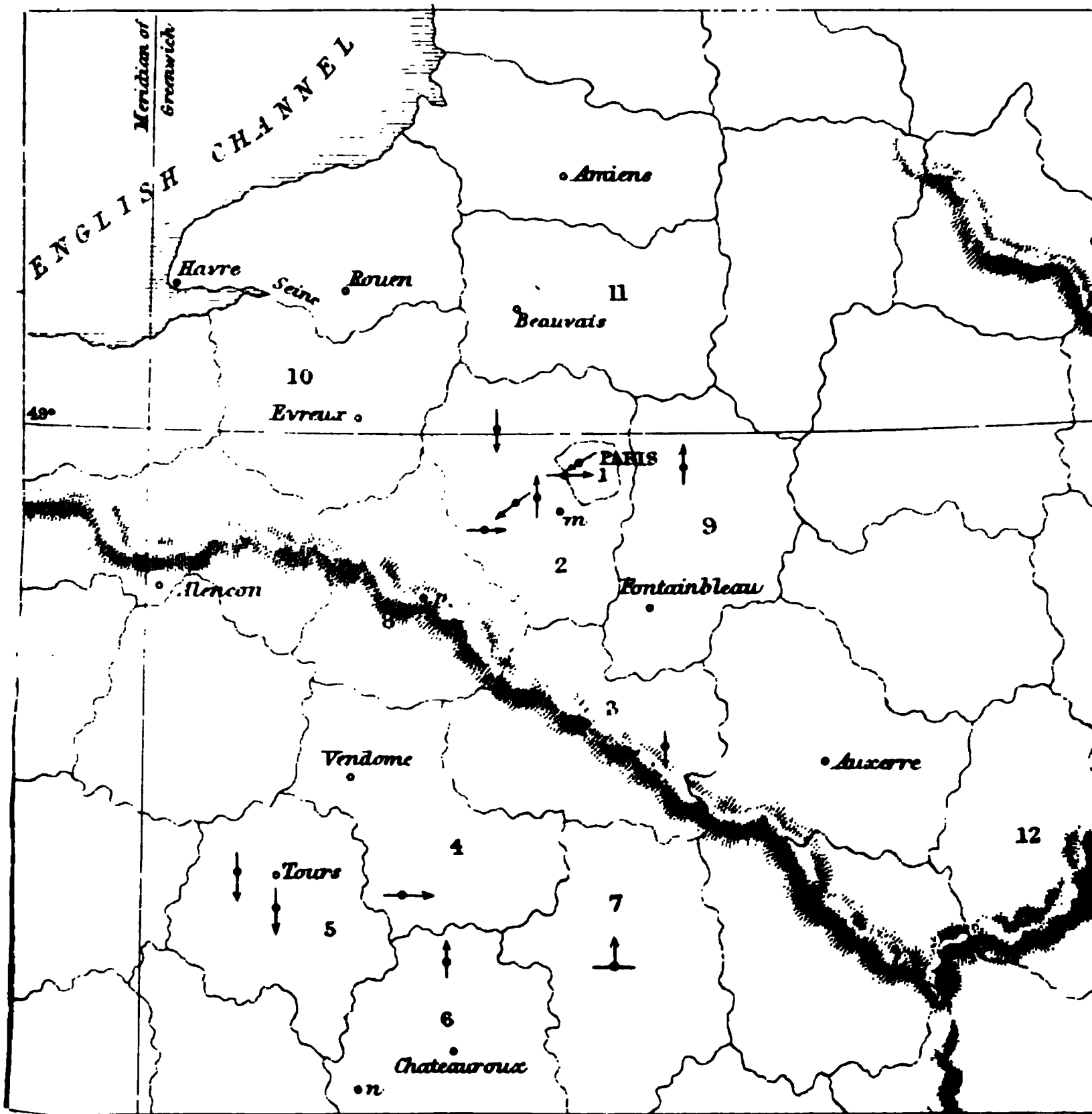


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PART OF FRANCE.

DIVIDED INTO DEPARTMENTS,

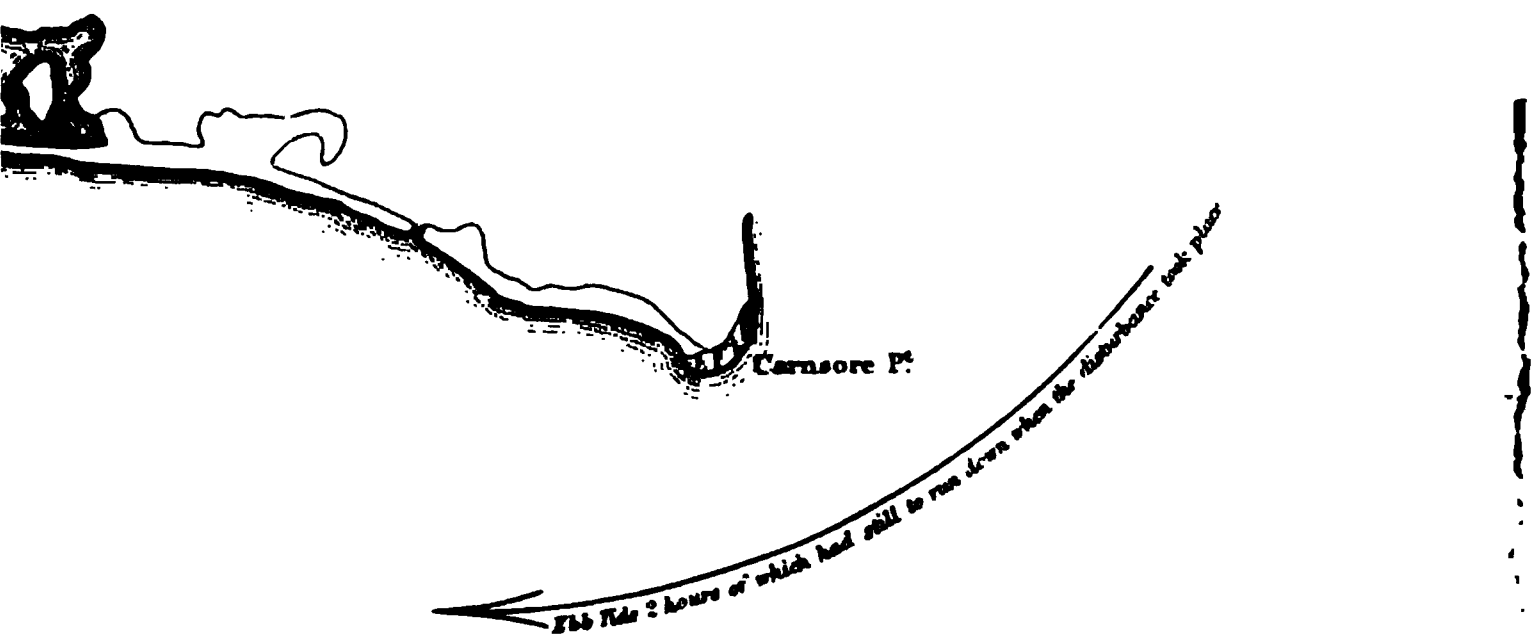
Referring to the Earthquake of 5th July 1841.



J. W. Low

REFERENCE

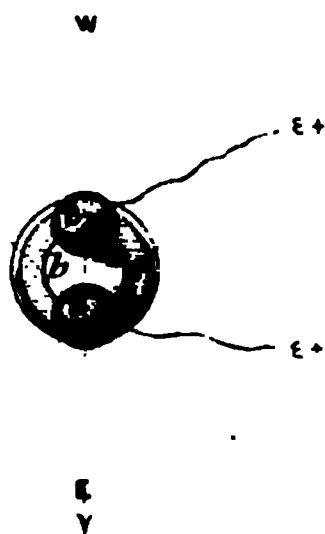
•→ . Horizontal direction —• . Vertical shock.



— SALTEE ISL^d



Fig. 6.



Full size

Part of Ball B

Fig. 7.

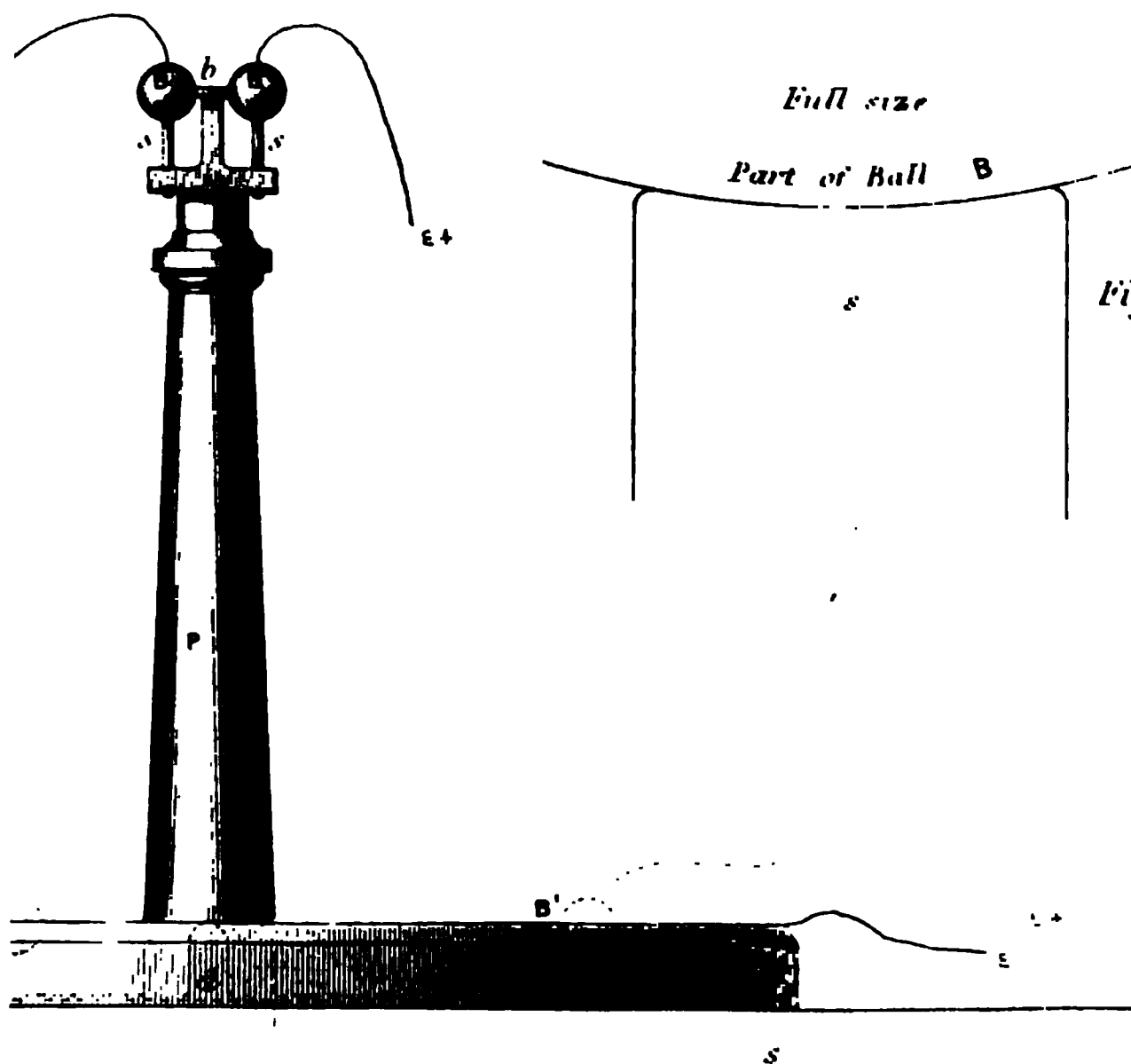
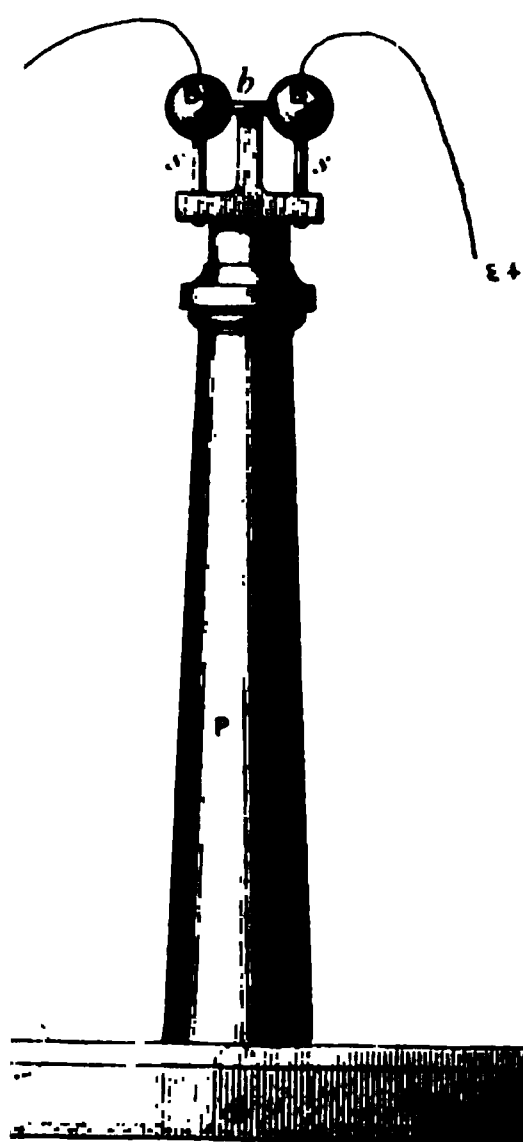
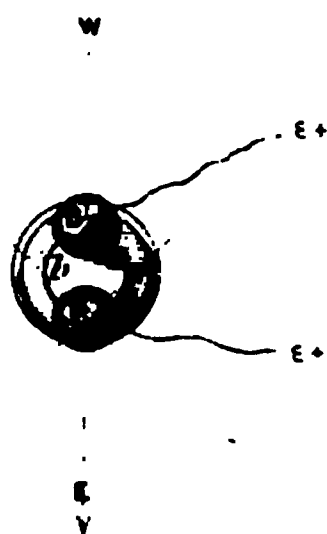




Fig. 6.



Full size
Part of Ball B

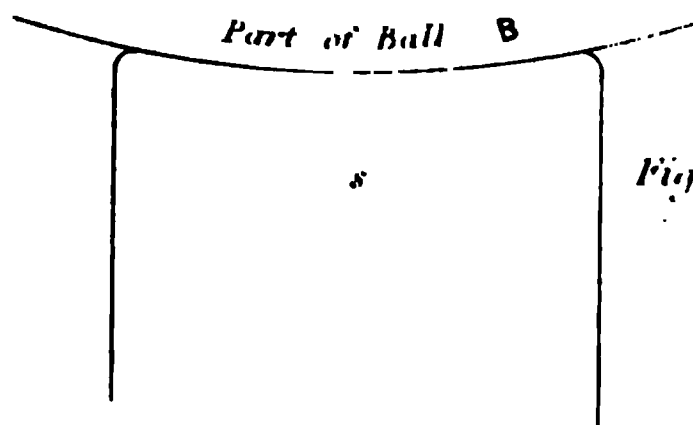
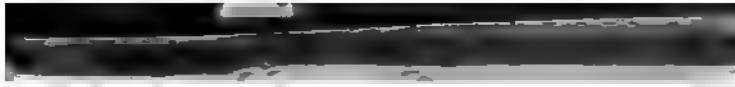


Fig. 7.



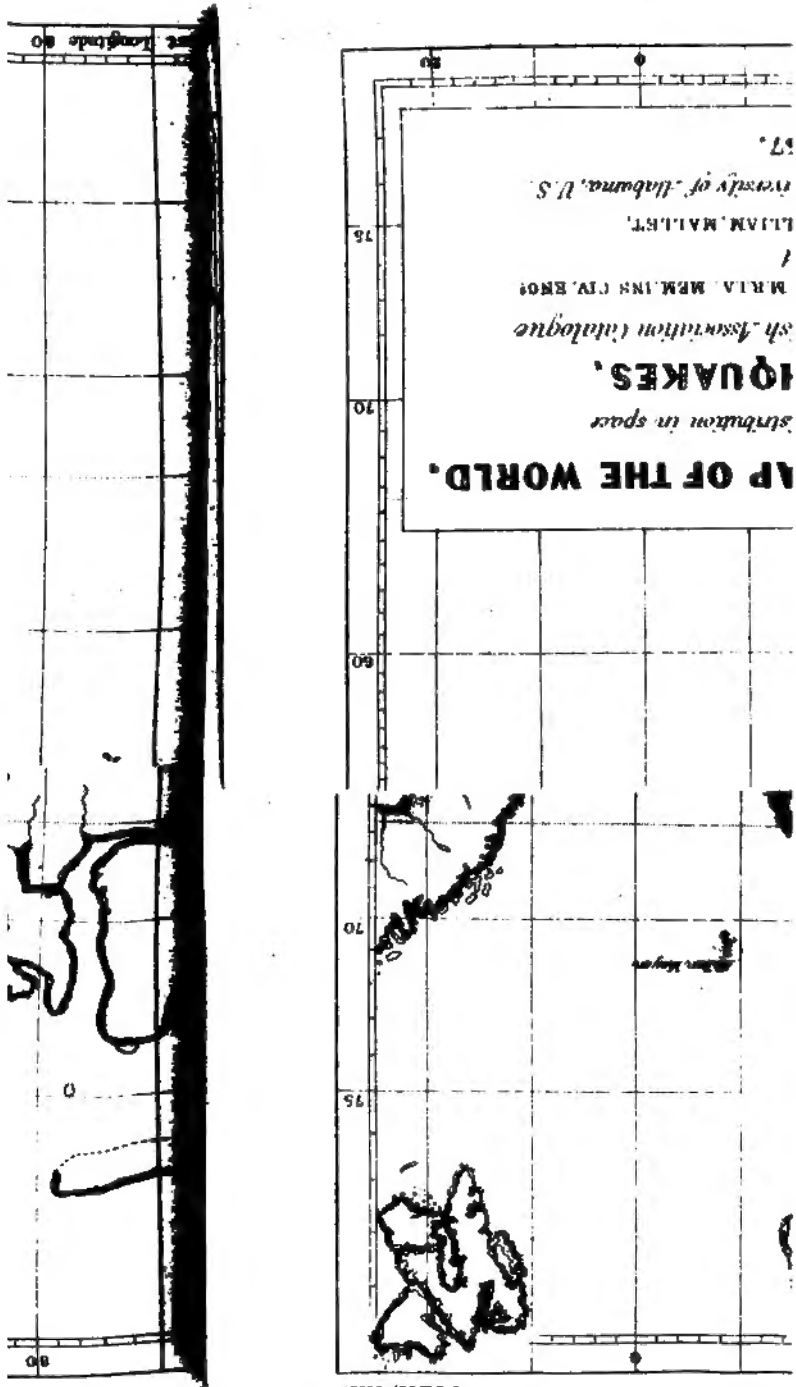


Plate XII.

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